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Vol 5 No 8

Sinclair plans for CP/M

THIS WEEK'S NEWS

SIR Clive Sinclair appears to have finally turned his back on microdrives, Sinclair Research's own controversial data storage system.

He confirmed at the launch of the Spectrum 128 last week (see *Popular Computing Weekly*, February 13, and inside story) that Sinclair Research was actively planning to introduce a disc drive for the Spectrum 128. This would open up the possibility of implementing CP/M with the machine, as Amstrad has al-

ready done with its CPC and PCW machines, and Commodore with the introduction of the Z80 second processor in

128. When asked if the Spectrum-

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 graphics and sound
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Brand-new - Mastertronic's Knight Tyne for Spectrum 128

● More Spectrum 128 packages

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ZOIDS

THE BATTLE BEGINS

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EDITORIAL

It is ironic that both Commodore and Amstrad have both announced so very different financial results at the same time - presenting diametrically opposite faces of the microcomputer industry.

At a time when Commodore continues to record losses and the question marks remain over the future of the American company, when Sinclair is still relying on its agreements with its creditors and bankers, when Acorn has retreated from the home market to scientific and educational pockets, Amstrad continues to confound the popular notion that the small computer industry either is in a steep decline, or 'died' at some point during 1985.

It is worthwhile to note too, that much of Amstrad's dramatically increased profits appear to be due to a machine that breaks no new ground technologically, but is priced attractively and packaged exactly right: the PCW 8256, of course.

Worthwhile, because Commodore has two potential contributors to

a turnaround in its fortunes - the Amiga and the C128 and 128D, although the last is only available in Europe. The Amiga is technologically ground-breaking to the hilt, but its price, while realistic, is not astonishing in the Amstrad sense of the word, and the packaging, in Europe at any rate, has still to be decided. The 128s on the other hand, or, at least, the disc version, offer far more of the mix of proven technology, comprehensive packaging and affordable pricing.

Sinclair has certainly headed the Amstrad success story. Indeed Bill Jeffrey, Sinclair's chief executive, said at the Spectrum 128 launch that he was impressed by Amstrad's performance on the strength of CP/M. The Spectrum 128 should shortly have a disc drive to go with it, and with that all the potential to implement CP/M. It is relying on its compatibility and familiarity to help Sinclair return to profitability. Any 'quantum leap', whether in the form of a 'no compromise' portable or a radical new machine with a nodding reference to the QL, will not now appear until profitability has been restored.

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Computer Trade Association Magazine of the Year

ABC

56,062 copies sold every week (Jan-June 1984 ABC).

Amstrad's profits soar – thanks to PCW 8256

AMSTRAD continues its computing success with the announcement of astonishingly high profits for the six months up to December 31, 1985.

Pre-tax profits stand at £27.54m – nearly three times that of the previous six months. This figure is also £7m more than Amstrad's £20.2m profit for the whole of 1984-85.

The PCW 8256 accounted for 21% of the company's total sales during the six months, despite the fact that it was first available three months into the six month period.

Over half of Amstrad's turnover (which was £128.31m in the six months to December) comes from overseas. City predictions state that as much as 65% of turnover will come from abroad for the full year, and forecasts of profits of £50m are now being made for 1985-86.

Alan Sugar, Amstrad's chairman, has a 50.4% holding in Amstrad. The latest results mean that his paper fortune has gone up to £188m.

Sound of music at Spectrum 128 launch

OVER 30 software companies demonstrated software for the Spectrum 128 at last week's launch in London (see *Popular Computing Weekly*, February 13). And although very little of the software written specifically for the machine is now available, the 128 itself is – and should be in the shops now.

Two software titles definitely available are Ocean's *Neverending Story* and Daley Thompson's *Supertest* – these are bundled with the machine and included in its £179.99 price tag.

Most of the products shown at the launch were listed in the last week's *Popular Computing Weekly*, but there have been some additions to the catalogue.

Sinclair plans for CP/M

◀ continued from page 1

compatible portable micro – known as Pandora – would also offer the CP/M operating system, Sir Clive replied, "Pandora could just be a CP/M machine". This implies that the portable will probably now contain a built-in disc

Ram Electronics is bringing out a Centronics interface and serial communications cable specifically for the 128, while



XRI Systems plans to be the first to offer packages to take advantage of the 128's MIDI capabilities. Its Micon MIDI

drive, or drives, rather than the mooted built-in microdrives.

A company spokesman further commented that the support of microdrives for the Spectrum 128 would not be discontinued.

Sir Clive also said that the company is dedicated to Spectrum technology in the long term, despite market re-

search predictions that the days of the 8-bit machine are numbered. "Spectrum technology will most certainly be around in 1987. We will have Pandora out later this year, and plans beyond that on the same line," he said. However, despite the failure of the QL to sell to the mass market, Sir Clive said that Sinclair was not abandoning the development of 16-bit machines. "We will see that both 16-bit and 8-bit technology will run together."

Plans for a successor to the QL, based on the 68008 processor, but substituting disc drives for the built-in microdrives, are apparently still being pursued at Sinclair Research, but it is now unlikely that a new QL machine will be launched this year.

On the subject of Sinclair's financial position, Sir Clive said that the current agreement with creditors was due for review at the end of March. "There is no question that we cannot reach a satisfactory conclusion," he said. He added that Sinclair's total debt was now "quite low", and that the company had paid over half of the £15m debt off.

Sinclair Research hopes to have paid off all debts by the autumn, and to announce a profit for the year beginning April 1, 1986. However, additional capital investment in the company would still be a bonus.

Commodore loses \$50m over Christmas

COMMODORE has reported a quarterly financial loss for the fourth consecutive time with the announcement that the company's deficit for the three months up to December 31, 1985 was \$53.2m (about £38m).

Its sales were marginally up on the corresponding pe-

riod the previous year – \$339.2m (£242m) as against \$338.7m (£241m). Then, however, the company showed a \$3m profit.

This time, pre-tax profits were \$1.05m (£750,000), but the costs of closing both the Corby assembly plant and a semi-conductor plant in Cali-

fornia accounted for \$22m (£15m) of the loss.

Commodore still claims that it expects to reach a satisfactory agreement with its bankers, and is predicting an earnings recovery this year, having taken steps to reduce costs.

The company has now lost \$92.4m (£66m) in the first six months of the current financial year, around four-fifths of the \$114m (£90m) it lost for the whole of the previous year.

● Commodore UK has undergone some personnel changes – general manager Nick Bessey has moved to head up Commodore Electronics, and Chris Kaday, after just six months with the company, is now acting general manager.

Wallow in MUD – at last

BRITISH Telecom's much-delayed implementation of MUD, the multi-player adventure game, should finally be available next week.

"MUD is going out of beta test and going live on February 24th," said Trevor Havelock of BT's New Information Services division.

"We have set up a 'Mud

line' where anyone who wants a Mudpack, which gives them their identity code and instructions, can ring up to order one."

The Mudpack which costs £20, includes three hours of playing time. After that the charge is £2 per hour.

The Mudline number for Mudpacks is 01-606 1173.

Alidin brings out oscilloscope

AN oscilloscope add-on has been developed for the Spectrum by Hampshire company Alidin.

The Alidin Scope package

comprises a hardware module which plugs into the Spectrum's expansion port, and software on tape or microdrive.

The module has three signal input connectors, the TV screen displays the continuously updated waveform, while the keyboard takes the place of the knobs and dials usually found on an oscilloscope.

The hardware costs £49.95, the software £24.95. Details from Alidin, 39 Kingsclere Road, Overton, Hampshire (0256 770488).

QL Comms cut

TANDATA'S communications package for the Sinclair QL, QL Comms, has been reduced in price by £80. The three modules Q-Connect, Q-Mod and Q-Call, will now sell for £129.95, as a single pack.

Tandata can be contacted at Albert Road North, Malvern, Worcs (06845 68421).

Three for the Spectrum 128 Domark enlarges the screen

THE Spectrum 128 Eureka monitor's most distinctive feature is that it displays programs without the black borders around the display, so that games screens fill the whole of the screen.

However, it also features a sound booster to amplify

sound before putting it out through the monitor, and the monitor itself powers the computer through the edge connector, so that one less plug is needed. It can also switch between a medium resolution colour screen to a green screen facility.

Saga chops Elite

SAGA Systems is to reduce the price of its top-of-the-range Saga 3 Elite keyboard for the Spectrum. Originally brought out at £79.95 last autumn, the Elite now costs £69.95.

Saga is also claiming full compatibility with the new Spectrum 128 for all its Spectrum keyboards: the Emperor, Plus, and Elite.

Further details from Saga Systems, 2 Eve Road, Woking, Surrey (04862 22977).

Spectrum acquires more mice

NIDD Valley, whose Slomo game speed controller attracted much attention last year, will be producing two mice for the Spectrum range - including the 128.

The Digimouse provides digital pulse output, and two interfaces will be available for it - one a low cost, basic facility interface, the other designed for the more professional user, with a centronics interface and direct interfacing to Nidd Valley's programmable keypad.

The second pointer, the Anamouse, uses analogue input, and is designed for the serious user, with three independently programmable buttons and Z axis control.

The Digimouse and Anamouse devices each cost £34.95, Digimouse's low-cost interface £14.95, the professional interface £34.95 and the Anamouse interface £14.95.

Details from Nidd Valley at Stepping Stones House, Thistle Hill, Knaresborough, N. Yorks (0423) 864488.

Commodore announces new holiday promotion

MORE promotional packages for the Commodore 64 and 128 have been announced by Commodore UK, with a chance this time of gaining a discount on your summer holiday. This new offer follows on from a similar holiday offer Commodore ran last year.

Each package containing either the 64, 128, 1570 or

1541 disc drives or any Commodore monitor will contain five £50 vouchers, which can be redeemed against the price of a selection of package holidays. However, some



Teletext adaptor

VOLEX Electronics has brought out a teletext adaptor for the Spectrum. The unit gives the user access to all teletext broadcasts in the UK, and a telesoftware downloading facility.

The package comprises the adaptor unit, Prom-based software, and a separate power supply unit.

It is available now and costs £99.99 from Volex at Lissadel Street, Salford M6 6AP.

tour operators may not take all five of the vouchers for a single holiday.

Commodore is continuing to sell the 64 as a compendium for £199.99, but the word 'Christmas' has been dropped and a new box designed.

The voucher offer is available from all Commodore outlets, and vouchers can be used up to October 1987.



The Eureka monitor will be available from Domark next month. A price has not yet been fixed but Domark hopes it will be under £250, and also plans versions compatible with Commodore, Acorn and Atari machines.



IMPORTANT Message for Amstrad Elite users

The first batch of Firebird's Amstrad version of Elite contains a bug which may make the game unplayable - the correct version has the name METROPOLITAN.

If you have bought the game and have encountered this problem please return the cassette **only** (i.e. not the box or instructions), together with your **name** and **address** to the address below and you will receive your new cassette by return of post together with a £2 voucher redeemable through our mailorder department for any of Firebird's products.



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(No stamp required)

QL Values

I write in reply to Ziggurat (Vol 5 No 6) and David Kelly's apparent total lack of knowledge concerning the QL and other MC68000 machines. Graphics handling on the QL is incredibly simple. Over 40 display routines are included as part of the QDOS operating system (which are called by SuperBasic instructions) and as such are available directly to assembly language. Also the amount of memory required to hold the display is 32K, exactly the same as for the Atari ST Series.

The QL is far from slow. The basic benchmarks for the machine only cover extremely small programs which tend to be efficient in most micros. However, for larger, more useful programs, the QL is the only micro not to slow down to a snail's pace but instead run at full speed due to intelligent variable handling techniques.

David Kelly implies that the QL is not particularly strong, or pleasant to use, in the field of programming. Why then does the machine possess ar-

guably the best and most structured basic of any home micro? Also which other home micro can boast a supply of 100% industry standard versions of C, Pascal, BCPL, Lisp, Fortran 77 and other popular languages?

The QL has its faults, its sound is inferior to that of the Commodore 64 and it could do with an improved keyboard. 'Media values' do play a large part in the success of a computer in a very competitive and prestige conscious market, but the abundance of articles written about the QL by people with no experience of the machine give little chance of its real virtues becoming apparent.

D J Parrott
61 Warrington Road
Dagenham
Essex

David Kelly replies: The 'media values' now demanded of a new home are quite specific. Hi res multi-colour graphics which can be easily animated and sophisticated music handling are essential requirements and the QL just does not deliver.

Despite its 16-bit proces-

sor, structured Basic and fast mathematical manipulation, no quantum leap is observed where it matters - on-screen.

In media value terms, even the Spectrum 128 beats it hands down.

Values QL

I would like to add more to the letter in Vol 5, No 6, by LW Tomlin. I ordered my QL in February 1984 and took delivery in July of that year. I dare say that Sir Clive, being enthusiastic about his creation, did try to rush the product on to the market and it was not without its faults and drawbacks. But it is easy to be wise after the event.

I have at present the latest machine, which is a pleasure to use and extremely reliable. I have also purchased the latest business software that comes free with all new machines and find it hard to fault. On request, I was also sent the Manual and User Guide, now issued with all new QL's and find it to be extremely accurate, easy to follow and a very interesting experience for the beginner

who has no knowledge of programming. What was wrong with the QL, is no longer true; the continuous development of peripheral manufacturers to design additional hardware etc, and Software houses to write programs for all types of operations should give the potential purchaser confidence that the QL is now a capable, reliable and deservicing machine.

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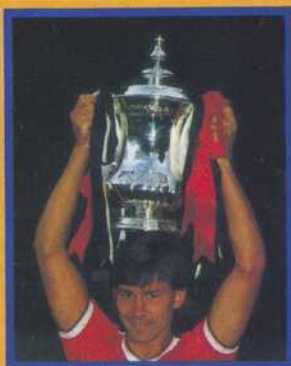
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Gandalf meets Aphrodite

Graham Taylor enters the world of MicroGnome, the privately-run database

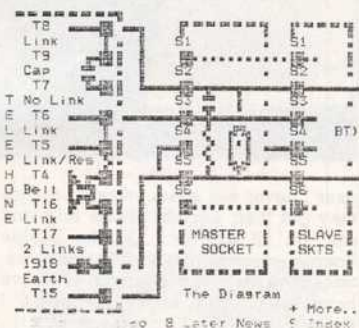
Though bearded and jovial, Glyn Phillips lacks either a pointed hat or a green tunic. He is not a gnome. He is, however, now the sole controller/organiser/manipulator/censor and instigator of a remarkable independent database called MicroGnome. It is his voice that resides in the messages that appear at the bottom of the Gnome pages, his electronic will that sends casual gnome browsers into obscure and uncharted sections of the database.

MicroGnome is, if not unique in this country, certainly special – a privately run database with hundreds of pages and plenty of characters. It contrasts with the big name systems in much the same way as pirate radio stations do with Radio One. It offers a surprisingly wide range of features from a political comment board, to a role playing game, to technical tips, news and reviews and, inevitably, babble boards where addicts have strange conversations on everything from blowing Eproms to the meaning of *Stairway to Heaven*.

Glyn Phillips runs MicroGnome from two rooms in a house in north London. Although it is based around BBC Bs, the system is surprisingly complicated. Several BBC computers are linked on an Econet system, some of which are used by Glyn to actually interact with and alter the system, while others have monitoring functions. Chugging away on the ground floor is an SJ Research file server attached to two twin disc drives which form most of MicroGnome itself.

telephone lines into the system, ie, only two people may be gnoming at the same time. "British Telecom is supposed to be putting in five more lines but it's been two more weeks for several months now," explained Glyn.

Despite the fact that many of those who try to contact MicroGnome will get an engaged tone, the signs are that the system is fairly popular – it gets around 800 calls a week spread through most of the day (things do tend to calm down between 2am and 10am when even database users need to sleep).



However, it is only very recently that Glyn has decided to start charging for the system. For £1.50 a month, you get a password that lets you on to parts of the system excluded to others and for 50p(!) you can rent your own frame, editing it to your own satisfaction. Buy several pages and you can build up your own mini-database under the pointed hat of MicroGnome itself.

The plea for subscriptions is only being moderately successful (18 at the last count) and the future of the whole Gnomonic empire is in doubt. "I'm prepared to make no money on the system but unless I can get, say 50, subscriptions over three months the system will be closed down, mainly because I'll have to move house and I don't see me being able to set it up again elsewhere." Gnomes everywhere take note.

"I find it strange that people are prepared to spend a small fortune on telephone charges but won't pay a small subscription," Glyn added.

But where does MicroGnome come from? Why does anybody want to devote so much effort and expertise to losing money so that other people can have a good time?

The history of MicroGnome is complicated. It was begun by a group of people collectively known as Soft Machinery of which Glyn was a member. Under that banner, MicroGnome was inaugurated on February 7, 1985. It wasn't and isn't

entirely altruistic.

MicroGnome is a sort of continuous demo of Glyn's work. What began as a commercial software package for the BBC from Communitel intended for people to get a 'feel' of developing and using databases has been slowly changed and adapted (soon to be adapted still further) into a very powerful system indeed. Glyn's work is the development and installation of private viewdata systems and MicroGnome is his portfolio.

"Probably the most difficult aspect of running any database is the routing – working out exactly what pages lead to and from one another. I have developed a system within MicroGnome that does that for you. If I insert a page under a certain heading, the program itself will automatically annotate all other relevant pages so that it becomes integrated into the system." Glyn illustrated the process with a short news piece concerning *Popular's* visit to Gnome control – it was impressive to see the system whizzing through various pages adding details of the new news page throughout the system.

Whatever the various financial considerations involved in running a database like MicroGnome, there is one other factor to be taken into account – it's enormously good fun. Whenever anyone links with MicroGnome, they type in their name and then look through the system. At the same time in MicroGnome control a BBC monitor says something like, "Gandalf browsing," or, "Fred editing" if Fred is actually writing a message to the system. Over a couple of hours different names arrive, leave, write messages, browse all monitored by the system.

The system is not passive. If he wishes, Glyn can take control and send messages to a user which appear as 'blipverts' – short lines of text at the bottom of the screen. More than that he can shunt the hapless victim off the whatever section of the database he chooses. The megalomaniac possibilities are endless but it has to be said that Glyn is generally very restrained in his use of the facility. The most common reason is one of censorship: "I won't let just anything go onto the system – I don't necessarily mind swearing as such, since it's a



Certain automatic functions are handled by AutoGnome, which is yet another BBC B, running a massive Basic program which handles functions like the amount of time everybody gets on the system and frequently issues a series of nagging messages telling recalcitrant users in ever less polite tones to get off the system.

Time is carefully limited on MicroGnome because Glyn only has two



Goblin David West made the mistake of asking us if we knew how to convert an old-style GPO telephone system into a glittering BT installation with plug-in extensions! So here it comes. The Gnomer's Guide to Rap Rod Rewiring:

First of all, you sneed The Diagram – for this you must press +..

When you've jotted down The Diagram, read The Gnotes that follow – for those you must press + again..

+ More..
2 Comunicado 8 Later News 9 Index

question of context, but we do get people who just want to waste their time writing a stream of filth".

In a few cases, people have actually been bounced off the system as soon as they've tried to log on. "There's one guy who's an out and out racist of the most overt sort. I let him on for a while in the interests of freedom of speech and getting some reaction but he's got so over the top recently I bounce him off if I come across him."

Aside from racists, there is another strange phenomenon to be found among the babbleboards of MicroGnome: "A lot of the users pretend to be women," explained Glyn. "I think they do it to wind up other (almost exclusively male) users. Conversations develop between them where one side doesn't know that the other side isn't female - if things start getting too excessive I stop it."

The curious case of the telephone transvestites brings us on to a general discussion of the curious character of MicroGnome users. What sort of people are they? Several of them are called Gandalf which is confusing, though Glyn says he can usually tell which Gandalf is which, Aphrodite is probably a guy in disguise and Richard Day is an ecology fan who does some nice designs. It's hard to say what these and the other users have in common. They tend to be adolescents though, with interests in wargames, science fiction, music and computers. Many have BBCs, some have Spectrums (you can always tell them because of the dodgy punctuation, according to Glyn) and not a few have QIs or are using a system at work clandestinely.

Glyn has some other observations. "You get some people who come in to the system, and spend hours on some elaborate design of their name using multi-coloured graphics - those are the



Glyn Phillips

ones I never see again, mainly because they get their horrific phone bills and are put off forever." On the Babble Boards, surprisingly, serious conversations develop between people who have never met. "The anonymity helps, I think."

"I must say it'd be nice if more women did use the system, I think we get a lot of people with very similar interests at the moment, and persuading more women to use MicroGnome would be one way of opening up the range of subjects discussed." That said, the current crop of MicroGnome features is fairly diverse even if the most popular ones are the same on databases all over the country.

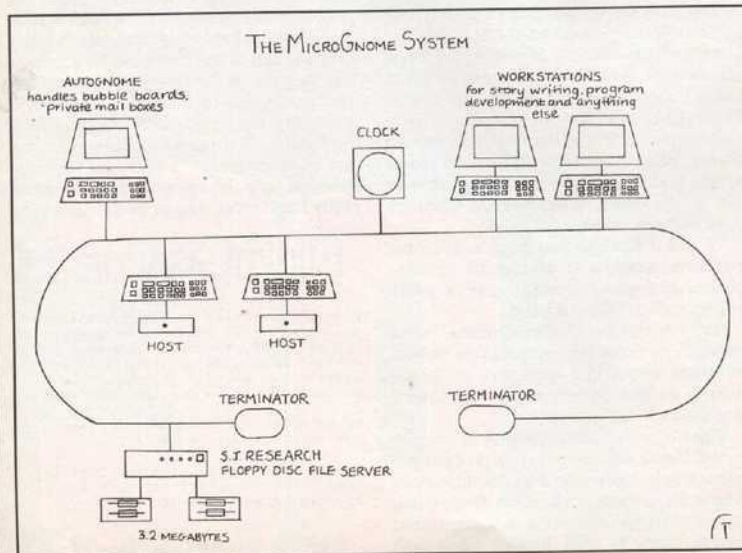
"The most popular features are the bulletin boards which function like loads of message slots." Several popular sections are run by other people who have pages of MicroGnome all to themselves. One of these is a role playing game run by Thanatos (not his real name, methinks). "The idea is to amass points and it involves working as a team with other players, but I don't really understand it," admitted Glyn. I couldn't understand it either but any role game that features spells entitled, "Oh, there it is!" or "Oh, go away!" is all right in my book.

Another key section is the technoboard where Glyn or other users try to answer questions placed there by desperate computer owners - (see the illustration on page 9 for the extraordinarily detailed answer to one question).

Added to that is news (MicroGnome had coverage of the BBC Master series before anyone else when pages of technical details were sent to the system 'live' from the launch actually using a Master BBC), a special Political Babble Board, and, of course, telesoftware.

And there is more, but not enough space, alas, to begin to come to grips with the mysterious Uncle Jim and the Gnome Rangers (a sort of ongoing send up of *Blue Peter*) and the strange story of "The Mystery of Batty Grange". Suffice to say that MicroGnome does more or less everything the 'real' databases do, with a good deal more spirit and humour, it currently fills over one and a half megabytes of disc space and could fill more, if people wanted it and BT finally manages to put in Glyn's telephone lines.

If you have a modem give it a try and, if you like it, don't forget to take out a subscription.



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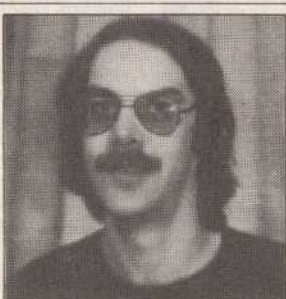
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• M A S T E R T R O N I C •

Package

Program Costa Capers Micro Spectrum Price £7.95
Supplier Firebird Software, Wellington House, Upper St Martin's Lane, London WC2H 9DL.

Welcome to Wish You Were On Holiday 86. This week we've asked Ted Blewitt to go on holiday in Spain.

Ted's holiday started well with an unusual loading sequence, the instructions appearing screen by screen as the tape prepared for warmer climes. Suitably Hispanic music played once the plane... sorry, micro was loaded, but Ted's problems began.

"It seemed my luggage had gone astray. In fact it had a life of its own and I had to run all over the place getting it back. I've had to buy most things again, and being short of cash I needed a credit card first."

Ted obviously isn't alone in facing these problems. Some adventurers who went to *Terrormolinos* faced exactly the same plot last year! But of course these tests are physical as well as the mental, as anybody who's worked as a Technician like Ted will know. Changing things in one screen may alter things in another, and some objects can't be obtained until other tasks have been completed.

Luckily Ted had good weather – almost too good, in fact, as he was forced to consume cans of lager to ward off dehydration and give him Dutch courage to complete certain otherwise impossible feats. And as day turned to night, Ted's holiday flew by and the 10th of August completion date approached.

Not much of a rest for Ted then and definitely hard work, but we can't help thinking a holiday isn't for everyone. It's best suited to those who want something similar every year and don't mind persisting with a tried and true formula.

For ourselves we thought it rather too much like work in the Chip Factory and that it Costa bit too much.

John Minson



Strategy

Program Ultima IV, Quest of the Avatar Micro CBM64, Atari + Disc Drive Price £66.00 approx Supplier Origin System, 340 Harvey Rd, Manchester, N.H. 03103 USA (Import)

I must admit, even though I am very keen on adventures, I have never had any leaning towards Role Playing Games, until now. *Ultima IV* is without a shadow of doubt the ultimate RP strategy game. Never has a game held my attention like this one does; it is a masterpiece of programming.

On first 'booting' the disc you are shown various options, such as Create new character, Journey onwards

Two timer

Program Brian/Survival Micro Spectrum **Price** £2.99
Supplier Central Solutions, 500 Chesham House, 150 Regent St. London W1R 5FA.

This is a release from a new budget software house Central Solution and offers a couple of *Quilled* adventures on one cassette.

The first, *Brian the Bold*, is set in the time of knights and damsels in distress and is the familiar tale of peasant boy given opportunity to rescue

Disc edit

Program *The Knife Micro*: Any Amstrad CP/M **Price** £12.95 **Supplier** Hisoft 180 High Street North, Dunstable, Beds LU6 1AT

The Knife is a disc sector editor for Amstrad 3" discs and as such it is competing with a range of similar programs that have recently appeared. While not extortionate, Hisoft's offering is not the cheapest you could buy and, unlike some others, it does not offer other disc utilities in the same package, but it does have some features that make it attractive.

(from previous play) etc. Your character is determined by answering questions put to you by an old gypsy and the computer then decides



which one of the eight characters you are most suited to be. The players range from Bards and Magis, to Paladins and Tinkers, all possessing different personalities and fighting ability.

Your quest is to learn the true qualities of life, ie, Honesty, Compassion, Valour, Justice, etc; this can only be

King's daughter and become
hero.

The second game, *Survival*, places you in the role of new MI5 agent, Gary Gullible (surely they could have thought of a better name?) who has to recover the standard set of stolen documents; you know the ones, they are stolen in so many other adventures that they must be a bit tatty by now!

These adventures follow a mainly linear pattern – solve problem, continue on to next location, etc, and are fairly lacking in atmosphere and descriptive detail.

The puzzles are not so

First of all it is powerful, but friendly. There are, in fact, two programs supplied that do two slightly different jobs and between them you should find the correct level of flexibility and ease of use to suit you. The editing control you are given over the disc is the equal of any I have seen; it is extremely easy to get to the desired sectors, tracks and files to make your changes, and it includes special options such as string or byte-sequence searches.

Secondly, since it runs under CP/M rather than Amdos, it will also work on the PCW 8256 computers, and is quite cheap for a program on this machine.

Thirdly, it comes supplied

done by exploring the 'Land of Britannia' and by interaction with people you will meet.

Weapons, armour and food can also be purchased from these towns, along with magical potions and other necessary items. All kind of strange beings will try to put an end to your exploits. Two-headed Ettins will throw boulders at you, rogues will rob you and don't make camp for the night in some strange forest.

Ultima IV comes complete with a large map of Britannia plus two thick books, informing you all about the world and its inhabitants. I think the price will put off a lot of possible buyers; however, in saying that, if you only buy one game this year, make it this one.

Roger Garrett



much brain teasing but more vocabulary lacking and there's nothing more annoying than knowing the solution to a puzzle only to be thwarted by choosing the wrong wording.

There are some graphics in the games making use of Gilsofts *Illustrator*, but are rather crude and unnecessary. There's no doubt that there are many better examples of *Quilled* adventures to be found, but at £2.99 I suppose these are just about worth a look.

Andy Moss



with the invariably excellent Hisoft documentation. In this case you are given a full beginner's course on the way CP/M (and hence Amsdos) disc directories and formats work.

I have in the past had hours of work saved by utilities such as this and really every serious user should have one 'just in case'. While for absolute novices, I would probably recommend Pride's *Oddjob* for features such as menu driven Unerasing of files, anyone who wants more control over their discs would do well to try *The Knife*.

Tony Kendle



First words

Program Wordplay Micro
BBC B Price £12.95 Supplier
BBC Soft, 35 Marylebone High
Street, London W1M 4AA

The single most useful piece of software for any micro is a wordprocessor. It makes sense therefore for children to learn about them as soon as possible. *Wordplay* is intended to make this fun.

You write on a screen where each function key calls upon an animated animal character to work on the text.

Each has a rhyming mnemonic to help you remember what it does. If you call for Elephant Eve to justify your text, for example, she walks up the page and tugs each line until it fits from edge to edge.

Storing the text is simplified to avoid confusions and there is even a spelling checker. Text is printed out (an adult section allows an expert to adapt the program to suit most printers) in large print on an A4 page. The idea is to offer a fun way to learn all about wordprocessing.

Sadly it fails. It ends up as a complicated wordprocessor where the "whistles and bells" just add to confusion

and time-wasting rather than helping, and in the tape version loading is painfully slow. Most wicked of all it requires Basic 2 and does not say so anywhere on the packaging or in the otherwise comprehensive booklet. It is obviously aimed at schools where many BBC micros were bought with Basic 1 and have not been updated. That means they cannot save or load texts, use the spelling-checker or even succeed in changing the display colours! Good idea, bad implementation. Not recommended.

Dave Watterson



Swing bat

Program Hardball Micro
Commodore 64 Price £9.95
Supplier US Gold, Unit 10,
Parkway Industrial Estate,
Leneage Street, Birmingham.

So here's the rub - Baseball, that good clean all-American game actually evolved from English Rounders in the late 1800's, and after weaning us Brits on grid iron



football, we are now to be shown the merits of the sport that made Babe Ruth famous.

This game has graphics which have to be seen to be believed and animation, especially on the batting screen, the best I've seen on the 64. But, are good graphics enough? No sir. A potentially superb simulation is let down by a set of dire instructions which assume you are familiar with typical Baseball terms like 'stealing', 'bunting' and 'double play' which, I would have thought, your average Britisher wouldn't have a clue about.

The batting screen gives a realistic view from behind the pitcher's mound and once your pitching choice has been selected watch him wind up and throw - it's a real treat. Once the batsman has hit the ball, the screen changes to the field and the ball is picked up by the nearest fielder and thrown back to a choice of the four bases. If there is a lot of action on screen, the ball comes back at a ridiculously slow speed which is a let down.

Hardball is the best simulation of the sport I've seen so far but having said that, there is still a need for improved presentation and explanation in order to appeal the potential fans this side of the pond.

Andy Moss



Head case

Program Groovy Garden Micro
Commodore 64 Price
£1.99 Supplier Central Solutions,
500 Chesham House,
150 Regent St, London W1R
5FD.

If software has taken huge leaps forward in the last two years, then with this game it takes giant steps backwards.

Mastertronic and Firebird

have shown that there is quality software in budget games, it's just a question of selection. If Central Solutions want to be taken seriously, they have to do a lot better than this rank awful game. The plot, what there is of it concerns you as a gardener protecting your four pigmy pines from an assortment of nasties ranging from bugs to empty dustbins, which you can despatch with your spray gun.

The game is, would you believe, a direct clone of *Space Invaders* and has ten

screens which get progressively more boring as the game goes on. The only saving grace is the use of colour which is bright and attractive. Your pneumatic spray gun can be replenished by a visit to the garden shed where Mr Potty is busy with his mower, and then you...

Stop! I can't take any more of this torture. Let me return to sanity and load up something else.

Andy Moss



Serious stuff

Program Pro-Fortran-77 Micro
QL Price £99.95 Supplier
Prospero Software, 190
Castelnau, London SW13
9DH.

Prospero Software's stand looked a bit out of place at this year's first ZX Microfair. While the visiting hordes sorted through countless games and varied peripherals, Prospero was promoting its QL Fortran-77 package and - after talking with the company's spokesman - I couldn't escape the feeling that they saw serious Sinclair users as an endangered species.

For QL owners who are interested in heavy duty number-crunching (and there must be some out there somewhere), Prospero's package offers the first full QL implementation of the ANSI X3.9-1978 standard for Fortran

(TDI's QL Fortran-77 is a near sub-set) with some useful added features. For example, there is an *Include* statement for calling upon commonly used or user-designed files of program sequences during compiling and the ability to use hexadecimal constants where ever an integer constant is allowed.

The (Sinclair approved) package comes on three microdrives and one Eprom cartridge. The microdrives may be easily duplicated or (with some added effort) transferred to disc and contain the run-time library, (GST) linker, compile-time error set and Fortran compiler programs. Also included are programs for adopting default devices and stack sizes to user requirements. The cartridge contains a "resident library" of machine-coded Fortran routines essential to most programs and is capable of multi-tasking operations. *Call* statements may be used to invoke

sub-routines written in assembly language to make up for any shortfalls in Fortran's capabilities to meet a user's particular requirements from program to program. The new GST macro assembler sold by Sinclair is apparently quite suitable.

While I haven't had a chance to try any large programs yet, Pro-Fortran-77 works very efficiently with smaller test runs and looks to be an excellent product for those wishing to put this admittedly specialist language on their QLs. If there is any obvious drawback, it's that the package requires at least 80k of Ram and the user is not going to be able to do much without an expanded QL. But, if the ZX Microfair is anything to go by, there will be a minority appeal in any event. Within this market, however, Pro-Fortran-77 demands some serious consideration.

Brian Beckett



PQ4570

POPULAR COMPUTING WEEKLY

Yankee connection

Peter Worlock dials up some American databases

In Britain, communications is still very much the poor relation of computer-related activities. Although the last year has seen a steady development of interest among UK micro users, we're still lagging a long way behind our American counterparts.

The purpose of this article is not to make British communicators green with envy, nor to blow the trumpet for American enterprise. It is simply a look at what is available in the US, based on the idea that what happens now in America is likely to happen soon in Britain.



One of the main drawbacks to the spread of communications fever in this country is cost. Over and above the cost of the computer, modem and software, are the costs of using the telephone. Even at cheap rates, this can be a considerable expense as it's easy to lose track of time when you're exploring new regions of an on-line database, or chatting to other users.

In the US, however, local phone calls are free, and since it's possible to log on to the major databases through local terminals, the cost of US communications is much lower.

Furthermore, the US has considerably more in the way of things to do with your communications system. At the lowest level, just as in this country, are the private bulletin boards, often run by computer hobbyists and aimed at similar users. However, demand for these services in the US is so high that many of them have now started charging subscription rates to cut down on the number of users!

Commercial systems

Here the US really leads. Whereas Britain features one service - Prestel - the US has several, most of them bigger and arguably better.

The two best-known are The Source and Compuserve. Compuserve is the

biggest with more than 250,000 subscribers. In addition to the usual features such as news, special interest groups and teleshopping, Compuserve has several multi-user games including the enormous *MegaWars III* the CB simulator service which features 72 channels allowing hundreds of users to talk on-line, a complete encyclopaedia at your fingertips, and specialised services such as weather briefings and radar maps for light aircraft pilots.

A new feature allows science fiction fans to read chapters from as-yet-unreleased books. You can even dump them to your printer to reduce on-line charges.

The Source offers similar services, but in a more serious vein. Following these two come a host of more recent services. Some are news-based, such as Delphi and Dow Jones News Retrieval. One of the more interesting is American People/Link which has opened its pages to special interest groups, Apple groups, etc, but APL has special sections for sports enthusiasts, aviators, and health fanatics.

One of the most interesting developments in US communications is the gradual move towards faster transmission speeds. In the UK most bulletin boards operate at 300 bits per second, while Prestel uses a 1200/75 system which means that the Prestel computer transmits at 1200 bits per second, but your computer talks back at only 75 baud - which makes features like the CB simula-

tors and chatlines a little tedious.

In America, however, many commercial systems are now offering full 1200/1200 rates, and an increasing number feature 2400/2400 facilities. Not only does this make interactive communication easier, it reduces costs since you can send and receive information eight times faster than with a 300/300 set-up. This allows you to make more use of one of the great features of US databases - the vast amount of very high quality, public-domain software which you can download to your own system for use later.

These superfast modems now cost as little as \$500 (about £350) while capable 300/300 modems are down to around the £40 mark.

US subscription

UK users who think they might get their money's worth from any of these services have the possibility of subscribing and it might not cost as much as you think. The key to low-cost trans-Atlantic comms is called packet-switched networking. This will allow you to hook up to American databases for the cost of the call to your local PSS terminal. Charges after that are based on the amount of information transmitted (the number of packets) and on-line charges to the service itself. You can get into PSS by subscribing to services such as Telecom Gold, and subscriptions to something like Compuserve can be obtained in the normal way, either by sending a money order, or by using a credit card.

Details on Compuserve can be obtained from PO Box 20212, Columbus, Ohio, USA OH43220, and The Source from 1616 Anderson Road, McLean, Virginia USA VA22102.



Communications

Hardware Skywave Multiport Interface/Skycom Rom/Voyager 7 Modem Micro Any Amstrad CPC Price £160.95 all inclusive. The modem alone costs £91.95. The cheapest interface package is multiport + Prism 2000 modem £99.95. Other modems available. **Supplier** Modem House or Skywave.

This communication package for the Amstrad CPCs consists of Modem House's Voyager 7, connected via the RS232 port of Skywave Software's Multiport interface and controlled by Skycom software supplied in Rom form. Different combinations are possible – the interface can be bought individually if you already have a modem, and vice versa – so it is worth looking at the parts individually.

A comms package can also be supplied for the PCW 8256 using the Voyager, but not the multiport.

There are much cheaper packages available if you are just interested in Micronet, Prestel or playing MUD. Skycom is aimed at those who want something a little more ambitious or unusual from their micro and who know that the extra is worth paying for.

plugs, so people with older phone systems may have problems. It does, however, give you the potential advantages of auto dialling. It is made special in this particular package by a small extra board that also gives you the facilities of auto-answering supported by the Skycom interface.

The only real criticism is that the dial on the front, by which you select the different transmit and receive modes, is so confusingly labelled that they may as well not have bothered. It is also not yet fully approved, a familiar story of red tape and backlogs.

For 95% of applications the modem will meet all your needs. Certain American Bulletin Boards use 2400 baud rates which work better across the Atlantic than others, but it's a specialist thing and if you can afford those phone bills, you can afford a bigger modem.

Multiport

The Multiport interface is a well made, solid, three way port. You are supplied with a standard RS232 D plug useable for all serial interfacing, printing, etc. Software to redirect the print output from the standard parallel port to the RS232 is promised. Something of a bonus, and perhaps unnecessary if you are just interested in communications, is a 24 way parallel port that is said to be 'quasi BBC User Port compatible'. What this means is that for various chip reasons it is only

well but looks a bit awkward.

The serial port can be set to transmit or receive baud rates between 9600 and 75, in a series of seven common combinations. You can also set parity, duplex, stop bits, etc. For most comms uses the appropriate combinations are available as menu options and you don't have to worry about setting them yourself.

Skycom

The Rom software and manual supplied for this article were just provisional. The first 'complete' version should be available in a few weeks, but Skywave says that it will be producing upgrades and improvements.

The existing package is nice, the equal of much that is around, with a Prestel mode, a Terminal mode (for bulletin boards with 80 column scrolling text) and a Telecom Gold mode. Telesoftware downloading is supported.

Although it comes on Rom, you will need a support disc or tape file to hold the phone numbers for auto-dialling, etc. The free memory is used as a buffer for holding characters that you have received, or wish to transmit. You can save the entire buffer, or individual Prestel pages, to disc, edit them, or even retransmit them.

However, more interesting than all this are all the extra features that are coming in the software upgrade; features that plug some gaps but are also likely to raise Skycom well above the more usual comms packages.

We are promised an auto log on facility and more file transfer options for user to user communication. There will be a format for connecting to the Open University computer and also something that is described as a 'simplified' IBM 3270 format. You will be able to connect to a new 80 column viewdata system called Casper, which will apparently give you access to Yellow Pages amongst other things. There will hopefully be a feature for downloading of CP/M software from Bulletin Boards.

These must represent a tremendous attraction for some specialised or business users and should guarantee Skycom considerable sales.

An auto answer system will also be included whereby people who dial will be shown a text file held on disc, as well as possibly being invited to enter a reply – a sort of text based answerphone or very simple Bulletin Board. A further Rom is also promised providing extensive software for running a proper Bulletin Board system from your own home, and Skywave promise that this, too, will contain some powerful features.

Skywave is planning to set up a Bulletin Board in its own office, but they have already paid for their own page on Prestel (£25886) called Skyclub which gives information for all users of Skycom – a level of customer support that they are justifiably proud of.

Tony Kendle



Voyager 7 plus interface

Voyager

The Voyager 7 is a reasonably sturdy, well built, modem. All common permutations on 75/300/1200 baud rates are offered, including reverse Prestel, as well as a test mode which connects the input with the output to communicate with yourself. It is mains powered and has a row of six LEDs along the front so that you know what is going on at any one time.

It connects directly into a phone socket, using one of those weird Telecom

possible to make the first 20 pins truly compatible. It will no doubt make the connection of most BBC peripherals feasible, if not instantaneous, and Skywave does have plans for using it.

The final port is the obligatory through connector for disc drive or other peripherals. Inside the multiport are two Rom sockets, but by the time the full Skycom software has been finished both will be used up. The board fits snugly with the 464, but an extension has to be fitted if you have a 664 or 6128. It works

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POP/CW/FEB'86

David Wallin returns with a series on communications

This week sees the start of a new regular feature in *Popular* - on communications.

Following my Bulletin Board feature in the December 12 issue, I'm back, and I'll be giving you all the latest news about BBs, modems and all that kind of thing.

Modems

There are probably many people who would like a modem and maybe have some Christmas money left.

There are now so many modems around that one is almost spoilt for choice. The table below should help you work out which modem will do the job you want.

Key Type: W - Hardwired modem. A - Acoustic coupler.

Speeds: D - Full duplex. If no D then half duplex.

Other symbols: * - As standard on modem. O - Available at an extra cost.

The question of BAPT approval on modems is an important one, and one that confuses many people. Put simply, if a green sticker is not given to a modem or any other piece of telephone equipment, for that matter, then you should not fit the item to your phone lines. You risk being disconnected if you do and you may damage your other phones. If there is a green sticker, then all is well.

The personal ratings in the table are obviously only a guide, and only you can decide which one would suit you. However, in my opinion the Demon modem



Graphics from Compunet by Bob Stevenson

is probably the best under £100 for any computer, except the BBC, where Le Modem is one of the best, as it comes with software on Rom.

The VTX 5000 is good for a Spectrum owner to start (as indeed I did). If you can afford it, the WS 2000 is the best all round device.

Modem features

Auto Dial

With a modem which has no Auto Dial, to phone a Bulletin Board or any modem service you have to use a telephone to dial and then listen for the carrier tone before proceeding (details in the Bulletin Board feature, *Popular Computing Weekly*, December 12). With an Auto Dial modem this is done automatically. You just tell the computer the phone number and it will do the rest.

Auto Answer

The modem and computer will 'listen' in

on your phone line and if another modem dials your number it will answer the phone and upload/download data from the call modem (like a telex) or do whatever the software tells it to.

Auto Baud Rate Scan

When the modem receives some data it will analyse it and decide what baud rate the data is being sent at and then set itself to be compatible with the other modem. A Bulletin Board which works on more than one speed, eg, Basildon ITeC 1200/75 & 300/300, will use baud rate scanning to select the speed of your modem so it is compatible with your modem.

Ans/Orig

When two modems are communicating at the same speed, ie, 300/300 rather than 1200/75 particularly if in full duplex then it is better if one is set to *ans* (answer) and the other to *orig* (originate).

Hardwired/Acoustic

A hardwired modem plugs directly into a BT phone socket in a wall and then the phone will usually be plugged into the modem. An acoustic modem is different - the phone is plugged into the wall socket as usual.

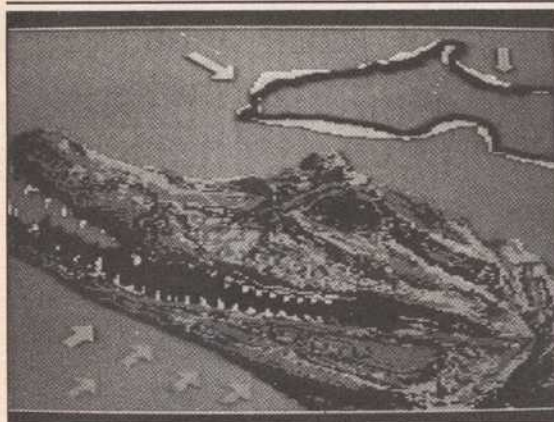
The modem is connected to the expansion/serial port on the micro as with any modem. The modem has two suction caps - one for the phone's mouthpiece and one for the phone's earpiece.

The earpiece of the phone is connected to its cap and so is the mouthpiece. This forms a direct link for the sound to follow straight into the modem. Due to the shape of the caps some acoustic modems only work with the older round ended phones.

The table is only a guide and the actual prices may differ by even up to £20 or more depending on the time of year and shop in which it is purchased. The features listed for each modem are believed to be correct at the time of press.

Model	Price	300/300	1200/75	12/12	Other	AD	AA	Supplier
Modem kit	£50	*						Maplin 0702-554155
Modem 1000	£50		*					Modem House 0392-69295
VTX 5000	£70	*		*				Modem House 0392-69295
Demon	£72	*	*		*	*	*	Walkbury Consultants 0733-238187
Minimodem	£75	*		*				Answercall 01-687 1133
Buzzbox	£80	*			*			Da Com System 0908-675511
Le MODEM	£89	*	*	*	*	*	*	Watford Electronics 0923-37774
64 Multimodem	£89	*	*	*	*	*	*	Miracle Technology 0473-216141
Compunet modem	£100		*					Compunet 01-637 0942
TM 110	£114	E	*	E	E	E	E	Tandata 06845-68421
Intermover	£118	*			*			Modular Tech 0869-253361
Nightingale	£137	*	*		*	E	E	Pace 0274-729306
Prospekt	£144	*	*	*	*			Interlekt 0734-589551
Chip Chat	£149	*	*	*	*		*	Digitolve 0977-513141
WS2000	£149	*	*	*	*			Miracle Technology 0473-216141
Amstrad Modem	£175	*	*	*	*	*	*	KDS Electronics 04853-2076
KN300	£180	*						K&N Electronics 0628-22447
QL Comms	£220		*			*		Tandata 06845-68421

Note: 12/12 denotes 1200/1200 baud; Other indicates more baud-rate and protocol options; E indicates option at extra cost.



Graphics by Hugh Riley (left) and Bob Stevenson (right), taken from Compunet

Speeds

Usually written as, for example, 1200/75, this indicates the receive/transmit speed of the modem in bits per second, or baud. There is another way of writing this speed: by a V number. V numbers refer to CCITT standards. If a modem complies to these standards then it can be advertised as, for example, V22 instead of 1200/1200 baud. I don't usually use V numbers because they require you to learn them and you can easily get them muddled up. However, for those

them muddled up. However, for those who are not easily muddled, here is a chart showing what V numbers are what baud rates.

CCITT V number	Baud rate
V21	300/300
V22	1200/1200
V22bis	2400/2400
V23	Viewdata Speed

Viewdata speed is 1200/75 or 75/1200 (reverse viewdata) or both.

Another problem with writing the CCITT way is that it doesn't tell you if it is

full or half duplex.

As you may have guessed, other similar numbers can refer to auto dial/answer, etc, but these are not so important and are not included.

If you have any queries, tips or comments to make about any aspect of micro communications, David Wallin would love to hear from you.

Write to him at *Popular Computing Weekly*, 12-13 Little Newport Street, London WC2H 1PP.

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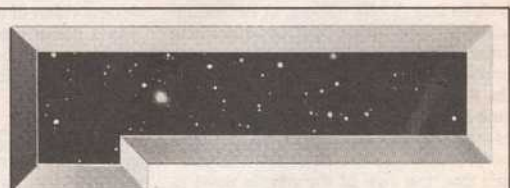
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FIREBIRD

Seeing is believing

David Lawrence and Mark England conclude our series with a look at the ST's graphics and sound capabilities.

The Graphics Display

At its simplest level, the monochrome display, the ST divides its screen up into 640x400 pixels and records the state of each pixel in the form of a single bit within a 32K area at the top of memory, so that each 16 bit word in memory will represent 16 pixels on the screen.

When we turn to the lower resolution modes of which the ST is capable, the situation becomes more complex because, one of the purposes of the lower resolution modes is also to allow the ST to define different "planes" on the screen so that it is almost as if either 2 or 4 different designs for the same screen display are being held in the memory at the same time.

The reason for this is colour. While one "bit" in memory corresponds to one pixel on the screen there is clearly no possibility of distinguishing between pixels on the basis of colour - a pixel is either off or it is on. Of course that in itself gives two possible colours, according to what the foreground and background are defined to be. In order to decide on more than two colours it is necessary to be able to record more than one item of information about each pixel. In fact the ST allows, in its "multi-plane" modes, either four or 16 items of information to be stored about each pixel.

In 2 plane mode, the data for each plane occupies half the full display memory and in 4 plane mode each plane occupies one quarter. In order to accomplish this, the size of the pixels used in defining the screen is increased so that in 2 plane mode, each pixel is twice the length vertically of a pixel in high resolution mode. In 4 plane mode each pixel is twice the size of a high resolution pixel in both height and width. The result is that the screen can be covered in fewer pixels and less memory is required to remember which pixels are on or off.

To minimise the amount of scurrying around the memory which the ST has to do when creating a display composed of more than one plane, the information for the separate planes is interwoven so that the data for a particular screen position on one plane is next to the data for the same screen position on another plane.

information about individual pixels. In this way, although there are fewer pixels, each one has more information about it sent out from the display memory.

The Colour Palette

The final link in the chain that leads to the creation of colour is the colour palette. We have already seen how the display memory and the video shift register can be combined to produce pixels which can either be in one of four states (in 2 plane mode) or in one of 16 states (in 4 plane mode). The usefulness of these numbers is that the ST possesses a set of 16 registers which can be used to allocate a different colour to each of the 16 values that a single pixel can take.

Each of the 16 registers has nine usable bits, three for each of the colours red, green and blue. What this means is that any one register can specify a colour made up of one of eight shades of red, one of eight shades of green and one of eight shades of blue - a total of 512 possible colours, though some will in effect be identical. Whichever colour is specified by colour register one will be the colour of every pixel whose combined planes produce a value of one for it.

In 4 plane mode, all of the 16 colour registers can be used, but in 2 plane mode only the first four colour registers have any effect.

Complex graphics

In all of this there is no reference to the way in which the ST can create and move complex shapes around the screen at such speed. The reason for this is that these abilities are an aspect of the Digital Research Gem system which is described in a separate article. Even so, the quality of what the user sees on the screen depends as much on the ST's hardware as it does on Gem and there is no doubt that in the graphics system of the ST the Gem system has met its match.

The Audio system

The last few years have seen an explosion of interest in the subject of the electronic generation of music. Musicians of even 10 years ago would probably find it difficult to believe the extent to which popular music of all kinds has been transformed by electronic techniques to the extent one or two musicians can today produce combinations of sound which would once have required half an orchestra.

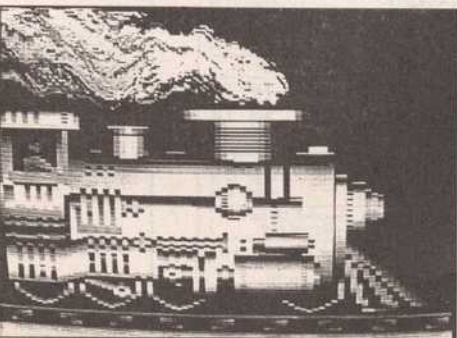
While at the top end of the market it is possible to pay many thousands of pounds for equipment to synthesize sound electronically, it is often not recognised that many of these systems are based on standard, inexpensive and widely available chips. While a system like the ST is clearly not going to be able to rival super-synthesizers in quality it is nevertheless based on a very capable sound chip produced by General Instruments and rejoicing in the name AY-3-8910. Using the full abilities of a synthesizer is seldom a simple matter, if only because understanding the nature of sound itself is seldom a simple matter, but if you care to make the effort it is quite possible to produce an astonishing range of effects.

In addition to the on-board sound capabilities of the ST, Atari have built into the ST the Midi interface which has become the industry standard for communication between electronic instruments and so the ST is capable of controlling a wide range of devices.

The Sound Generator

The Programmable Sound Generator chip is the device used by the ST to produce, through an external speaker like that of the monitor, all the sounds of which the system is capable, from the full score of a piece of classical music to a single key-click. The PSG has the capability to produce tones with a frequency anywhere in the capability to produce tones with a frequency anywhere in the range of 30 hertz (30 cycles per second) up to 125 kilohertz (125,000 cycles per second) or, to put it another way, from some of the lowest recognisable tones to above the range of hearing.

Each single note which the ST produces is the work of the PSG alone, relieving the main system of the need to be constantly checking that a particular note has been played for the correct amount of time of whether the "shape" of the note has to be altered as it progresses in order to create the correct "envelope". The main-system plays a part, however, in that the PSG has to be supplied with the notes it is to play, in order, together with information about their length, shape and so on. The PSG is capable of dealing



The Video Shift Register

It is all very well saying that the memory is arranged in this way or that to achieve the necessary 1, 2 or 4 planes, but how is this data transformed into a display? Part of the answer is the work of the "video shift register" which can take display data from memory in the multi-plane modes and re-arrange it into colour

ST Series

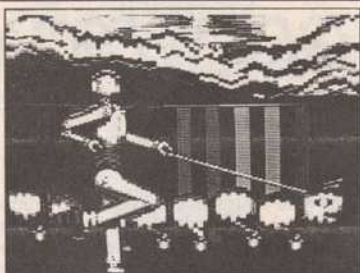
with instructions for three separate "voices" at the same time, that is to say it can play three completely separate sequences of notes, thus allowing harmonies to be created.

The work of outputting the resulting notes to the external speaker is also performed by the PSG.

The PSG has a variety of internal registers which are used to control its activities in each of the three voices. The most important registers are the tone generators, which produce a wave with a square shape of varying frequency. A separate noise generator provides a more random wave form. A mixer control register allows the outputs of the tone generators and noise generator to be mixed together.

The amplitude, or volume, of a tone is controlled by the amplitude registers. The amplitude of a particular tone can either be set to a constant level or the note can be given a shape, or "envelope" using the envelope generator registers in conjunction with the amplitude registers.

The question of note envelopes is quite a complex one which cannot be discussed in detail here but briefly, the distinctive sound of any particular instrument is a matter of the combination of the shape of the sound wave it produces (or the combination of different shaped waves), together with the envelope of



the note – the way in which its amplitude rises and falls over its duration.

Instruments with sharp or "twangy" sounds tend to produce notes which rise from nothing very quickly and then die away quickly.

Slightly softer sounding instruments may produce notes which rise more slowly but linger longer.

The Midi Interface

The ST comes equipped with the Midi interface, an acronym which stands for Musical Instrument Digital Interface. The basis of the standard is agreed form of "serial communication" (see the later section on the RS232 port) at a rate of 31250 bits per second. Midi is simple, almost crude in its connections, requiring two channels – Midi In and Midi Out – with a third channel called Midi Thru

which allows data to pass along the channel provided by the other two, bypassing the piece of equipment fitted with the interface.

On the ST the Midi interface is controlled by another Motorola developed chip, the MC68850, which is a communications chip.

The object of Midi is to allow any two electronic instruments which conform to the standard to swap information and instructions about what they are doing and what they expect other pieces of equipment to do.

Midi is an ideal standard for a micro-computer in that it is relatively simple to implement and requires only a 5-pin DIN plug to connect up equipment which can then be controlled by the micro.

Within certain limits, the Midi interface allows the user to communicate with up to 16 different pieces of equipment to produce complex synchronised effects or complete compositions – but do be sure, before you rush out and spend more on a set of equipment than on the ST itself, that you have the software to deal with the equipment.

There are differences between the ways manufacturers implement the Midi control codes and mistakes can be expensive. This is not simple, and an area for specialist advice but you can be sure that if all else is well, the ST won't hold you back.

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CRYPTO

by James Tallett

This program is really written for the younger user who wants to send and receive 'secret' messages, but can be used by anyone where prying eyes are not wanted.

When loaded the menu will be displayed giving you the option of encrypting text or decrypting a previously encrypted text. When encrypting you will be given the choice of saving your encrypted text to tape and/or printer, and when decrypting you can enter your encrypted code via the keyboard or direct from tape. Your decrypted text will then appear on screen with the option of printing the decrypted text to printer or rerunning the program. In either case at the start you will be asked

for a code number; this can be any number between 1 and 9999 inclusive. It is imperative that the same number is used for decryption as encryption or else you will finish up with nonsense or at the worst an "integer out of range" error message. Your code number is not included on the tape saved code or printout of the encrypted code for obvious reasons, but you could obviously write a list of code numbers with a friend to be used on certain source dates.

The program works by using the code number as a seed for Randomise which will cause each random number to be picked in a set sequence starting at a certain place set by the function (see Chapter 11 of the Spectrum manual). So

when encrypting, the code number of each character of the text is added to the next (pseudo) random number in the sequence multiplied by the code number. When decrypting, the reverse is the case as the encrypted code is taken away from the random number. The result of this is that even keywords and graphics characters can be encrypted and decrypted.

The program is about 8K long so if you do not fancy typing it all in you can get a copy on tape by sending £2 to me at Vatersay, Kyltra, Fort Augustus, Inverness-shire, PH32 4BY. If anyone is interested I also have a ZX81 (16K) version but it does not have the facility of saving and loading the code to/from tape.

```

10 REM **INITIALISATION**
11
20 POKE 23609,50: REM keyboard
beep
25 POKE 23658,0: REM caps lock
off
30 LET tapesave=300
35 LET tapeload=360
40 LET rerun=400
50 LET keyboard=500
55 LET codee=530
58 LET codee2=530
60 LET codee0=600
65 LET lprint=660
70 LET txtinpt=700
75 LET decrypt=750
80 LET encrypt=800
90 LET savcode=900
100 BORDER 1: POKE 23693,15: CL
S
110 LET s$="*****SPECTRUM CRY
PIOTOGRAPH*****"
*****
120
130 REM **MENU**
140
150 PRINT s$
160 PRINT "TAB 11: **MENU**"
170 PRINT "Enter: "
180 IF INKEY$="" THEN GOTO 190
190 IF INKEY$="E" THEN GOTO 200
200 IF INKEY$="D" THEN GOTO 210
210 IF INKEY$="Y" THEN GOTO 220
220 IF INKEY$="N" THEN GOTO 230
230 IF INKEY$="P" THEN GOTO 240
240 IF INKEY$="Q" THEN GOTO 250
250 IF INKEY$="R" THEN GOTO 260
260 IF INKEY$="S" THEN GOTO 270
270 IF INKEY$="T" THEN GOTO 280
280 IF INKEY$="U" THEN GOTO 290
290 IF INKEY$="V" THEN GOTO 300
300 IF INKEY$="W" THEN GOTO 310
310 IF INKEY$="X" THEN GOTO 320
320 IF INKEY$="Z" THEN GOTO 330
330 IF INKEY$="0" THEN GOTO 340
340 IF INKEY$="1" THEN GOTO 350
350 IF INKEY$="2" THEN GOTO 360
360 IF INKEY$="3" THEN GOTO 370
370 IF INKEY$="4" THEN GOTO 380
380 IF INKEY$="5" THEN GOTO 390
390 IF INKEY$="6" THEN GOTO 400
400 IF INKEY$="7" THEN GOTO 410
410 IF INKEY$="8" THEN GOTO 420
420 IF INKEY$="9" THEN GOTO 430
430 IF INKEY$="A" THEN GOTO 440
440 IF INKEY$="B" THEN GOTO 450
450 IF INKEY$="C" THEN GOTO 460
460 IF INKEY$="D" THEN GOTO 470
470 IF INKEY$="E" THEN GOTO 480
480 IF INKEY$="F" THEN GOTO 490
490 IF INKEY$="G" THEN GOTO 500
500 IF INKEY$="H" THEN GOTO 510
510 IF INKEY$="I" THEN GOTO 520
520 IF INKEY$="J" THEN GOTO 530
530 IF INKEY$="K" THEN GOTO 540
540 IF INKEY$="L" THEN GOTO 550
550 IF INKEY$="M" THEN GOTO 560
560 IF INKEY$="N" THEN GOTO 570
570 IF INKEY$="O" THEN GOTO 580
580 IF INKEY$="P" THEN GOTO 590
590 IF INKEY$="Q" THEN GOTO 600
600 IF INKEY$="R" THEN GOTO 610
610 IF INKEY$="S" THEN GOTO 620
620 IF INKEY$="T" THEN GOTO 630
630 IF INKEY$="U" THEN GOTO 640
640 IF INKEY$="V" THEN GOTO 650
650 IF INKEY$="W" THEN GOTO 660
660 IF INKEY$="X" THEN GOTO 670
670 IF INKEY$="Y" THEN GOTO 680
680 IF INKEY$="Z" THEN GOTO 690
690 IF INKEY$="0" THEN GOTO 700
700 IF INKEY$="1" THEN GOTO 710
710 IF INKEY$="2" THEN GOTO 720
720 IF INKEY$="3" THEN GOTO 730
730 IF INKEY$="4" THEN GOTO 740
740 IF INKEY$="5" THEN GOTO 750
750 IF INKEY$="6" THEN GOTO 760
760 IF INKEY$="7" THEN GOTO 770
770 IF INKEY$="8" THEN GOTO 780
780 IF INKEY$="9" THEN GOTO 790
790 IF INKEY$="A" THEN GOTO 800
800 IF INKEY$="B" THEN GOTO 810
810 IF INKEY$="C" THEN GOTO 820
820 IF INKEY$="D" THEN GOTO 830
830 IF INKEY$="E" THEN GOTO 840
840 IF INKEY$="F" THEN GOTO 850
850 IF INKEY$="G" THEN GOTO 860
860 IF INKEY$="H" THEN GOTO 870
870 IF INKEY$="I" THEN GOTO 880
880 IF INKEY$="J" THEN GOTO 890
890 IF INKEY$="K" THEN GOTO 900
900 IF INKEY$="L" THEN GOTO 910
910 IF INKEY$="M" THEN GOTO 920
920 IF INKEY$="N" THEN GOTO 930
930 IF INKEY$="O" THEN GOTO 940
940 IF INKEY$="P" THEN GOTO 950
950 IF INKEY$="Q" THEN GOTO 960
960 IF INKEY$="R" THEN GOTO 970
970 IF INKEY$="S" THEN GOTO 980
980 IF INKEY$="T" THEN GOTO 990
990 IF INKEY$="U" THEN GOTO 1000
1000 IF INKEY$="V" THEN GOTO 1010
1010 IF INKEY$="W" THEN GOTO 1020
1020 IF INKEY$="X" THEN GOTO 1030
1030 IF INKEY$="Y" THEN GOTO 1040
1040 IF INKEY$="Z" THEN GOTO 1050
1050 IF INKEY$="0" THEN GOTO 1060
1060 IF INKEY$="1" THEN GOTO 1070
1070 IF INKEY$="2" THEN GOTO 1080
1080 IF INKEY$="3" THEN GOTO 1090
1090 IF INKEY$="4" THEN GOTO 1100
1100 IF INKEY$="5" THEN GOTO 1110
1110 IF INKEY$="6" THEN GOTO 1120
1120 IF INKEY$="7" THEN GOTO 1130
1130 IF INKEY$="8" THEN GOTO 1140
1140 IF INKEY$="9" THEN GOTO 1150
1150 IF INKEY$="A" THEN GOTO 1160
1160 IF INKEY$="B" THEN GOTO 1170
1170 IF INKEY$="C" THEN GOTO 1180
1180 IF INKEY$="D" THEN GOTO 1190
1190 IF INKEY$="E" THEN GOTO 1200
1200 IF INKEY$="F" THEN GOTO 1210
1210 IF INKEY$="G" THEN GOTO 1220
1220 IF INKEY$="H" THEN GOTO 1230
1230 IF INKEY$="I" THEN GOTO 1240
1240 IF INKEY$="J" THEN GOTO 1250
1250 IF INKEY$="K" THEN GOTO 1260
1260 IF INKEY$="L" THEN GOTO 1270
1270 IF INKEY$="M" THEN GOTO 1280
1280 IF INKEY$="N" THEN GOTO 1290
1290 IF INKEY$="O" THEN GOTO 1300
1300 IF INKEY$="P" THEN GOTO 1310
1310 IF INKEY$="Q" THEN GOTO 1320
1320 IF INKEY$="R" THEN GOTO 1330
1330 IF INKEY$="S" THEN GOTO 1340
1340 IF INKEY$="T" THEN GOTO 1350
1350 IF INKEY$="U" THEN GOTO 1360
1360 IF INKEY$="V" THEN GOTO 1370
1370 IF INKEY$="W" THEN GOTO 1380
1380 IF INKEY$="X" THEN GOTO 1390
1390 IF INKEY$="Y" THEN GOTO 1400
1400 IF INKEY$="Z" THEN GOTO 1410
1410 IF INKEY$="0" THEN GOTO 1420
1420 IF INKEY$="1" THEN GOTO 1430
1430 IF INKEY$="2" THEN GOTO 1440
1440 IF INKEY$="3" THEN GOTO 1450
1450 IF INKEY$="4" THEN GOTO 1460
1460 IF INKEY$="5" THEN GOTO 1470
1470 IF INKEY$="6" THEN GOTO 1480
1480 IF INKEY$="7" THEN GOTO 1490
1490 IF INKEY$="8" THEN GOTO 1500
1500 IF INKEY$="9" THEN GOTO 1510
1510 IF INKEY$="A" THEN GOTO 1520
1520 IF INKEY$="B" THEN GOTO 1530
1530 IF INKEY$="C" THEN GOTO 1540
1540 IF INKEY$="D" THEN GOTO 1550
1550 IF INKEY$="E" THEN GOTO 1560
1560 IF INKEY$="F" THEN GOTO 1570
1570 IF INKEY$="G" THEN GOTO 1580
1580 IF INKEY$="H" THEN GOTO 1590
1590 IF INKEY$="I" THEN GOTO 1600
1600 IF INKEY$="J" THEN GOTO 1610
1610 IF INKEY$="K" THEN GOTO 1620
1620 IF INKEY$="L" THEN GOTO 1630
1630 IF INKEY$="M" THEN GOTO 1640
1640 IF INKEY$="N" THEN GOTO 1650
1650 IF INKEY$="O" THEN GOTO 1660
1660 IF INKEY$="P" THEN GOTO 1670
1670 IF INKEY$="Q" THEN GOTO 1680
1680 IF INKEY$="R" THEN GOTO 1690
1690 IF INKEY$="S" THEN GOTO 1700
1700 IF INKEY$="T" THEN GOTO 1710
1710 IF INKEY$="U" THEN GOTO 1720
1720 IF INKEY$="V" THEN GOTO 1730
1730 IF INKEY$="W" THEN GOTO 1740
1740 IF INKEY$="X" THEN GOTO 1750
1750 IF INKEY$="Y" THEN GOTO 1760
1760 IF INKEY$="Z" THEN GOTO 1770
1770 IF INKEY$="0" THEN GOTO 1780
1780 IF INKEY$="1" THEN GOTO 1790
1790 IF INKEY$="2" THEN GOTO 1800
1800 IF INKEY$="3" THEN GOTO 1810
1810 IF INKEY$="4" THEN GOTO 1820
1820 IF INKEY$="5" THEN GOTO 1830
1830 IF INKEY$="6" THEN GOTO 1840
1840 IF INKEY$="7" THEN GOTO 1850
1850 IF INKEY$="8" THEN GOTO 1860
1860 IF INKEY$="9" THEN GOTO 1870
1870 IF INKEY$="A" THEN GOTO 1880
1880 IF INKEY$="B" THEN GOTO 1890
1890 IF INKEY$="C" THEN GOTO 1900
1900 IF INKEY$="D" THEN GOTO 1910
1910 IF INKEY$="E" THEN GOTO 1920
1920 IF INKEY$="F" THEN GOTO 1930
1930 IF INKEY$="G" THEN GOTO 1940
1940 IF INKEY$="H" THEN GOTO 1950
1950 IF INKEY$="I" THEN GOTO 1960
1960 IF INKEY$="J" THEN GOTO 1970
1970 IF INKEY$="K" THEN GOTO 1980
1980 IF INKEY$="L" THEN GOTO 1990
1990 IF INKEY$="M" THEN GOTO 2000
2000 IF INKEY$="N" THEN GOTO 2010
2010 IF INKEY$="O" THEN GOTO 2020
2020 IF INKEY$="P" THEN GOTO 2030
2030 IF INKEY$="Q" THEN GOTO 2040
2040 IF INKEY$="R" THEN GOTO 2050
2050 IF INKEY$="S" THEN GOTO 2060
2060 IF INKEY$="T" THEN GOTO 2070
2070 IF INKEY$="U" THEN GOTO 2080
2080 IF INKEY$="V" THEN GOTO 2090
2090 IF INKEY$="W" THEN GOTO 2100
2100 IF INKEY$="X" THEN GOTO 2110
2110 IF INKEY$="Y" THEN GOTO 2120
2120 IF INKEY$="Z" THEN GOTO 2130
2130 IF INKEY$="0" THEN GOTO 2140
2140 IF INKEY$="1" THEN GOTO 2150
2150 IF INKEY$="2" THEN GOTO 2160
2160 IF INKEY$="3" THEN GOTO 2170
2170 IF INKEY$="4" THEN GOTO 2180
2180 IF INKEY$="5" THEN GOTO 2190
2190 IF INKEY$="6" THEN GOTO 2200
2200 IF INKEY$="7" THEN GOTO 2210
2210 IF INKEY$="8" THEN GOTO 2220
2220 IF INKEY$="9" THEN GOTO 2230
2230 IF INKEY$="A" THEN GOTO 2240
2240 IF INKEY$="B" THEN GOTO 2250
2250 IF INKEY$="C" THEN GOTO 2260
2260 IF INKEY$="D" THEN GOTO 2270
2270 IF INKEY$="E" THEN GOTO 2280
2280 IF INKEY$="F" THEN GOTO 2290
2290 IF INKEY$="G" THEN GOTO 2300
2300 IF INKEY$="H" THEN GOTO 2310
2310 IF INKEY$="I" THEN GOTO 2320
2320 IF INKEY$="J" THEN GOTO 2330
2330 IF INKEY$="K" THEN GOTO 2340
2340 IF INKEY$="L" THEN GOTO 2350
2350 IF INKEY$="M" THEN GOTO 2360
2360 IF INKEY$="N" THEN GOTO 2370
2370 IF INKEY$="O" THEN GOTO 2380
2380 IF INKEY$="P" THEN GOTO 2390
2390 IF INKEY$="Q" THEN GOTO 2400
2400 IF INKEY$="R" THEN GOTO 2410
2410 IF INKEY$="S" THEN GOTO 2420
2420 IF INKEY$="T" THEN GOTO 2430
2430 IF INKEY$="U" THEN GOTO 2440
2440 IF INKEY$="V" THEN GOTO 2450
2450 IF INKEY$="W" THEN GOTO 2460
2460 IF INKEY$="X" THEN GOTO 2470
2470 IF INKEY$="Y" THEN GOTO 2480
2480 IF INKEY$="Z" THEN GOTO 2490
2490 IF INKEY$="0" THEN GOTO 2500
2500 IF INKEY$="1" THEN GOTO 2510
2510 IF INKEY$="2" THEN GOTO 2520
2520 IF INKEY$="3" THEN GOTO 2530
2530 IF INKEY$="4" THEN GOTO 2540
2540 IF INKEY$="5" THEN GOTO 2550
2550 IF INKEY$="6" THEN GOTO 2560
2560 IF INKEY$="7" THEN GOTO 2570
2570 IF INKEY$="8" THEN GOTO 2580
2580 IF INKEY$="9" THEN GOTO 2590
2590 IF INKEY$="A" THEN GOTO 2600
2600 IF INKEY$="B" THEN GOTO 2610
2610 IF INKEY$="C" THEN GOTO 2620
2620 IF INKEY$="D" THEN GOTO 2630
2630 IF INKEY$="E" THEN GOTO 2640
2640 IF INKEY$="F" THEN GOTO 2650
2650 IF INKEY$="G" THEN GOTO 2660
2660 IF INKEY$="H" THEN GOTO 2670
2670 IF INKEY$="I" THEN GOTO 2680
2680 IF INKEY$="J" THEN GOTO 2690
2690 IF INKEY$="K" THEN GOTO 2700
2700 IF INKEY$="L" THEN GOTO 2710
2710 IF INKEY$="M" THEN GOTO 2720
2720 IF INKEY$="N" THEN GOTO 2730
2730 IF INKEY$="O" THEN GOTO 2740
2740 IF INKEY$="P" THEN GOTO 2750
2750 IF INKEY$="Q" THEN GOTO 2760
2760 IF INKEY$="R" THEN GOTO 2770
2770 IF INKEY$="S" THEN GOTO 2780
2780 IF INKEY$="T" THEN GOTO 2790
2790 IF INKEY$="U" THEN GOTO 2800
2800 IF INKEY$="V" THEN GOTO 2810
2810 IF INKEY$="W" THEN GOTO 2820
2820 IF INKEY$="X" THEN GOTO 2830
2830 IF INKEY$="Y" THEN GOTO 2840
2840 IF INKEY$="Z" THEN GOTO 2850
2850 IF INKEY$="0" THEN GOTO 2860
2860 IF INKEY$="1" THEN GOTO 2870
2870 IF INKEY$="2" THEN GOTO 2880
2880 IF INKEY$="3" THEN GOTO 2890
2890 IF INKEY$="4" THEN GOTO 2900
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2920 IF INKEY$="7" THEN GOTO 2930
2930 IF INKEY$="8" THEN GOTO 2940
2940 IF INKEY$="9" THEN GOTO 2950
2950 IF INKEY$="A" THEN GOTO 2960
2960 IF INKEY$="B" THEN GOTO 2970
2970 IF INKEY$="C" THEN GOTO 2980
2980 IF INKEY$="D" THEN GOTO 2990
2990 IF INKEY$="E" THEN GOTO 3000
3000 IF INKEY$="F" THEN GOTO 3010
3010 IF INKEY$="G" THEN GOTO 3020
3020 IF INKEY$="H" THEN GOTO 3030
3030 IF INKEY$="I" THEN GOTO 3040
3040 IF INKEY$="J" THEN GOTO 3050
3050 IF INKEY$="K" THEN GOTO 3060
3060 IF INKEY$="L" THEN GOTO 3070
3070 IF INKEY$="M" THEN GOTO 3080
3080 IF INKEY$="N" THEN GOTO 3090
3090 IF INKEY$="O" THEN GOTO 3100
3100 IF INKEY$="P" THEN GOTO 3110
3110 IF INKEY$="Q" THEN GOTO 3120
3120 IF INKEY$="R" THEN GOTO 3130
3130 IF INKEY$="S" THEN GOTO 3140
3140 IF INKEY$="T" THEN GOTO 3150
3150 IF INKEY$="U" THEN GOTO 3160
3160 IF INKEY$="V" THEN GOTO 3170
3170 IF INKEY$="W" THEN GOTO 3180
3180 IF INKEY$="X" THEN GOTO 3190
3190 IF INKEY$="Y" THEN GOTO 3200
3200 IF INKEY$="Z" THEN GOTO 3210
3210 IF INKEY$="0" THEN GOTO 3220
3220 IF INKEY$="1" THEN GOTO 3230
3230 IF INKEY$="2" THEN GOTO 3240
3240 IF INKEY$="3" THEN GOTO 3250
3250 IF INKEY$="4" THEN GOTO 3260
3260 IF INKEY$="5" THEN GOTO 3270
3270 IF INKEY$="6" THEN GOTO 3280
3280 IF INKEY$="7" THEN GOTO 3290
3290 IF INKEY$="8" THEN GOTO 3300
3300 IF INKEY$="9" THEN GOTO 3310
3310 IF INKEY$="A" THEN GOTO 3320
3320 IF INKEY$="B" THEN GOTO 3330
3330 IF INKEY$="C" THEN GOTO 3340
3340 IF INKEY$="D" THEN GOTO 3350
3350 IF INKEY$="E" THEN GOTO 3360
3360 IF INKEY$="F" THEN GOTO 3370
3370 IF INKEY$="G" THEN GOTO 3380
3380 IF INKEY$="H" THEN GOTO 3390
3390 IF INKEY$="I" THEN GOTO 3400
3400 IF INKEY$="J" THEN GOTO 3410
3410 IF INKEY$="K" THEN GOTO 3420
3420 IF INKEY$="L" THEN GOTO 3430
3430 IF INKEY$="M" THEN GOTO 3440
3440 IF INKEY$="N" THEN GOTO 3450
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3480 IF INKEY$="R" THEN GOTO 3490
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3650 IF INKEY$="8" THEN GOTO 3660
3660 IF INKEY$="9" THEN GOTO 3670
3670 IF INKEY$="A" THEN GOTO 3680
3680 IF INKEY$="B" THEN GOTO 3690
3690 IF INKEY$="C" THEN GOTO 3700
3700 IF INKEY$="D" THEN GOTO 3710
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3750 IF INKEY$="I" THEN GOTO 3760
3760 IF INKEY$="J" THEN GOTO 3770
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3810 IF INKEY$="O" THEN GOTO 3820
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3830 IF INKEY$="Q" THEN GOTO 3840
3840 IF INKEY$="R" THEN GOTO 3850
3850 IF INKEY$="S" THEN GOTO 3860
3860 IF INKEY$="T" THEN GOTO 3870
3870 IF INKEY$="U" THEN GOTO 3880
3880 IF INKEY$="V" THEN GOTO 3890
3890 IF INKEY$="W" THEN GOTO 3900
3900 IF INKEY$="X" THEN GOTO 3910
3910 IF INKEY$="Y" THEN GOTO 3920
3920 IF INKEY$="Z" THEN GOTO 3930
3930 IF INKEY$="0" THEN GOTO 3940
3940 IF INKEY$="1" THEN GOTO 3950
3950 IF INKEY$="2" THEN GOTO 3960
3960 IF INKEY$="3" THEN GOTO 3970
3970 IF INKEY$="4" THEN GOTO 3980
3980 IF INKEY$="5" THEN GOTO 3990
3990 IF INKEY$="6" THEN GOTO 4000
4000 IF INKEY$="7" THEN GOTO 4010
4010 IF INKEY$="8" THEN GOTO 4020
4020 IF INKEY$="9" THEN GOTO 4030
4030 IF INKEY$="A" THEN GOTO 4040
4040 IF INKEY$="B" THEN GOTO 4050
4050 IF INKEY$="C" THEN GOTO 4060
4060 IF INKEY$="D" THEN GOTO 4070
4070 IF INKEY$="E" THEN GOTO 4080
4080 IF INKEY$="F" THEN GOTO 4090
4090 IF INKEY$="G" THEN GOTO 4100
4100 IF INKEY$="H" THEN GOTO 4110
4110 IF INKEY$="I" THEN GOTO 4120
4120 IF INKEY$="J" THEN GOTO 4130
4130 IF INKEY$="K" THEN GOTO 4140
4140 IF INKEY$="L" THEN GOTO 4150
4150 IF INKEY$="M" THEN GOTO 4160
4160 IF INKEY$="N" THEN GOTO 4170
4170 IF INKEY$="O" THEN GOTO 4180
4180 IF INKEY$="P" THEN GOTO 4190
4190 IF INKEY$="Q" THEN GOTO 4200
4200 IF INKEY$="R" THEN GOTO 4210
4210 IF INKEY$="S" THEN GOTO 4220
4220 IF INKEY$="T" THEN GOTO 4230
4230 IF INKEY$="U" THEN GOTO 4240
4240 IF INKEY$="V" THEN GOTO 4250
4250 IF INKEY$="W" THEN GOTO 4260
4260 IF INKEY$="X" THEN GOTO 4270
4270 IF INKEY$="Y" THEN GOTO 4280
4280 IF INKEY$="Z" THEN GOTO 4290
4290 IF INKEY$="0" THEN GOTO 4300
4300 IF INKEY$="1" THEN GOTO 4310
4310 IF INKEY$="2" THEN GOTO 4320
4320 IF INKEY$="3" THEN GOTO 4330
4330 IF INKEY$="4" THEN GOTO 4340
4340 IF INKEY$="5" THEN GOTO 4350
4350 IF INKEY$="6" THEN GOTO 4360
4360 IF INKEY$="7" THEN GOTO 4370
4370 IF INKEY$="8" THEN GOTO 4380
4380 IF INKEY$="9" THEN GOTO 4390
4390 IF INKEY$="A" THEN GOTO 4400
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4460 IF INKEY$="H" THEN GOTO 4470
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4630 IF INKEY$="Y" THEN GOTO 4640
4640 IF INKEY$="Z" THEN GOTO 4650
4650 IF INKEY$="0" THEN GOTO 4660
4660 IF INKEY$="1" THEN GOTO 4670
4670 IF INKEY$="2" THEN GOTO 4680
4680 IF INKEY$="3" THEN GOTO 4690
4690 IF INKEY$="4" THEN GOTO 4700
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4720 IF INKEY$="7" THEN GOTO 4730
4730 IF INKEY$="8" THEN GOTO 4740
4740 IF INKEY$="9" THEN GOTO 4750
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4770 IF INKEY$="C" THEN GOTO 4780
4780 IF INKEY$="D" THEN GOTO 4790
4790 IF INKEY$="E" THEN GOTO 4800
4800 IF INKEY$="F" THEN GOTO 4810
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4840 IF INKEY$="J" THEN GOTO 4850
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4860 IF INKEY$="L" THEN GOTO 4870
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4890 IF INKEY$="O" THEN GOTO 4900
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4950 IF INKEY$="U" THEN GOTO 4960
4960 IF INKEY$="V" THEN GOTO 4970
4970 IF INKEY$="W" THEN GOTO 4980
4980 IF INKEY$="X" THEN GOTO 4990
4990 IF INKEY$="Y" THEN GOTO 5000
5000 IF INKEY$="Z" THEN GOTO 5010
5010 IF INKEY$="0" THEN GOTO 5020
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5030 IF INKEY$="2" THEN GOTO 5040
5040 IF INKEY$="3" THEN GOTO 5050
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5160 IF INKEY$="F" THEN GOTO 5170
5170 IF INKEY$="G" THEN GOTO 5180
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5190 IF INKEY$="I" THEN GOTO 5200
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5230 IF INKEY$="M" THEN GOTO 5240
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5260 IF INKEY$="P" THEN GOTO 5270
5270 IF INKEY$="Q" THEN GOTO 5280
5280 IF INKEY$="R" THEN GOTO 5290
5290 IF INKEY$="S" THEN GOTO 5300
5300 IF INKEY$="T" THEN GOTO 5310
5310 IF INKEY$="U" THEN GOTO 5320
5320 IF INKEY$="V" THEN GOTO 5330
5330 IF INKEY$="W" THEN GOTO 5340
5340 IF INKEY$="X" THEN GOTO 5350
5350 IF INKEY$="Y" THEN GOTO 5360
5360 IF INKEY$="Z" THEN GOTO 5370
5370 IF INKEY$="0" THEN GOTO 5380
5380 IF INKEY$="1" THEN GOTO 5390
5390 IF INKEY$="2" THEN GOTO 5400
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5410 IF INKEY$="4" THEN GOTO 5420
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5460 IF INKEY$="9" THEN GOTO 5470
5470 IF INKEY$="A" THEN GOTO 5480
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5520 IF INKEY$="F" THEN GOTO 5530
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5630 IF INKEY$="Q" THEN GOTO 5640
5640 IF INKEY$="R" THEN GOTO 5650
5650 IF INKEY$="S" THEN GOTO 5660
5660 IF INKEY$="T" THEN GOTO 5670
5670 IF INKEY$="U" THEN GOTO 5680
5680 IF INKEY$="V" THEN GOTO 5690
5690 IF INKEY$="W" THEN GOTO 5700
5700 IF INKEY$="X" THEN GOTO 5710
5710 IF INKEY$="Y" THEN GOTO 5720
5720 IF INKEY$="Z" THEN GOTO 5730
5730 IF INKEY$="0" THEN GOTO 5740
5740 IF INKEY$="1" THEN GOTO 5750
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5760 IF INKEY$="3" THEN GOTO 5770
5770 IF INKEY$="4" THEN GOTO 5780
5780 IF INKEY$="5" THEN GOTO 5790
5790 IF INKEY$="6" THEN GOTO 5800
5800 IF INKEY$="7" THEN GOTO 5810
5810 IF INKEY$="8" THEN GOTO 5820
5820 IF INKEY$="9" THEN GOTO 5830
5830 IF INKEY$="A" THEN GOTO 5840
5840 IF INKEY$="B" THEN GOTO 5850
5850 IF INKEY$="C" THEN GOTO 5860
5860 IF INKEY$="D" THEN GOTO 5870
5870 IF INKEY$="E" THEN GOTO 5880
5880 IF INKEY$="F" THEN GOTO 5890
5890 IF INKEY$="G
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```

2030 PRINT "Enter *****"
2040 INPUT "Enter instructions to decrypt message: "
2050 RETURN TO MENU *****
2060 IF INKEY="" THEN GO TO 2100
2070 GO SUB keyboard
2080 GO SUB 2100 AND b=1: INKEY=""
2090 AND b=2: 1:2080 AND INKEY=""
2100 GO TO 2080
2110 BEEP 1.35: RUN
2120 REM *****
2130
2140
2150 BEEP 1.35: CLS: PRINT "*****"
2160 PRINT "First you will be asked for your password. It can be any number between 1 and 9999. It is very important that you use the same number as the number was used to encrypt the message."
2170
2180 PRINT "Next you will be given the option of loading the message from tape or typing it in by hand."
2190
2200 PRINT "Your message will then be decrypted and printed onto the screen. You will also be given the option of saving the decrypted message to a printer."
2210 PRINT "1. Press any key to continue."
2220 IF INKEY="" THEN GO TO 2160
2230
2240 REM *****
2250
2260 BEEP 1.35: CLS: PRINT "*****"
2270 PRINT "Decrypt message."
2280 PRINT "1. Input code from tape or keyboard."
2290 REM ***** REM Caps lock
2300 IF INKEY="" THEN GO TO 2160
2310
2320 IF INKEY="1" THEN BEEP 1.35: GO SUB tapeLoad: GO TO 2300
2330 IF INKEY="2" THEN BEEP 1.35: GO SUB code: GO TO 2300
2340 GO TO 2300
2350 GO SUB decrypt
2360 PRINT "1. Linedprint message of letters."
2370 REM flashing initials
2380 IF INKEY="" THEN GO TO 2160
2390
2400 POKE 23658: 8
2410 IF INKEY="L" THEN BEEP 1.35: GO SUB L: GO TO 2300
2420 IF INKEY="S" THEN BEEP 1.35: GO SUB S: GO TO 2300
2430 IF INKEY="R" THEN BEEP 1.35: GO SUB R: GO TO 2300
2440 GO SUB return: BEEP 1.35: GO TO 2310
2450 GO TO 2340
2460
2470
2480 REM *****
2490
2500 CLEAR: CLS: PRINT "Save program"
2510 INPUT "Enter save title:"
2520 IF Z$="" THEN GO TO 2500
2530 PRINT "Save title: " Z$
2540 PRINT "Save Z$ to S"
2550 PRINT "Save Z$ to S"
2560 PRINT "Save Z$ to S"
2570 PRINT "Save Z$ to S"
2580 PRINT "Save Z$ to S"
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3980 PRINT "Save Z$ to S"
3990 PRINT "Save Z$ to S"
4000 PRINT "Save Z$ to S"

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3DC0	:F01118A58369C1B5, 3FO	4130	:EEEEEEEEEEEEEEEE222, 67E	44A0	:8870A57189C088571, 36C
3DCB	:93A584692081818, 3E0	4138	:22222222222222222, 440	44AB	:A00F0A0BC3204C, 42E
3DD0	:4CBE19A58369DF018, 3E0	4140	:22222222222222222, 1DC	44BB	:932018A576860885, 2DC
3DD8	:A584692118A573A4, 47C	4148	:1EEEE2E2E2E2E2E2, 3B4	44BB	:769C02E87716A578, 39A
3DE0	:7920D118A8738A18, 337	4150	:22222222222222222, 442	44CB	:8578858C867897012, 44E
3DE8	:80C86973608C1118, 27E	4158	:22222222222222222, 2A8	44CB	:60A93C0581A9C085, 36A
3DFO	:A90CA000991218C8, 2D4	4160	:52E2E2E2E2E2E2E2, 5E3	44D0	:828B49FFA82907785, 3BF
3DF8	:C016D0F8A0C11880, 3D3	4168	:22222222222222222, 478	44D8	:809A0A8A4A0A8A8, 33E
3E00	:8C1118C0C0F038C, 3E8	4170	:22222222222222222, 130	44E0	:0A28820A28820A28, 194
3E08	:01F03C0C003F043C0, 3E3	4178	:22222222222222222, 110	44E8	:8285807976C38578, 414
3E10	:04F0A4C0C0F051C0, 404	4180	:22222222222222222, 110	44F0	:8285807976C38578, 414
3E18	:03F063C0C37F074C0, 444	4188	:22222222222222222, 110	44F8	:7760AD4C71C39FF0, 4A0
3E20	:08F018C0C0F00C0C, 393	4190	:22222222222222222, 15D	4500	:14A94F8D8220A817, 2FB
3E28	:0AFO0B0C0C0C04AC, 3B1	4198	:40217302328172B2, 2AC	4508	:89320C8B718AC4E, 32E
3E30	:118804C8C1A428E, 2AC	4200	:74C0F893B131842A, 3CB	4510	:1820A2080A08B8D, 2DE
3E38	:1A4CAB1AA7A9A873, 35E	4208	:00B0C0C2C1ED323A, 391	4518	:8220A9189D8320A, 33F
3E40	:8E12188C131880A4, 273	4210	:B000C2B18B13D8A, 391	4520	:AAC3118AD8918C9, 38E
3E48	:72A8738E131881E, 2E8	4218	:82890018C088B18E, 2E3	4528	:8000000000000000, 080
3E50	:1880CA479A8738E18, 352	4220	:10E181813432B182, 38C	4530	:0000000000000000, 000
3E58	:1880C171860A479A8, 2F8	4228	:8281889E4232152A, 2B8	4538	:0000000000000000, 000
3E60	:A479A8738E181881E, 35E	4230	:C0C4F7C0B4A0D78, 32D	4540	:0000000000000000, 000
3E68	:A479A8738E1A188C, 382	4238	:52B241B008B30E18, 388	4548	:0000000000000000, 000
3E70	:131880C4A79A8738E, 357	4240	:F241F45948A0E103, 397	4550	:0000000000000000, 000
3E78	:241F45948A0E103, 397	4248	:CA7A8C7C0D8E9A8, 498	4558	:0000000000000000, 000
3E80	:A8738E1C188C1D18, 29C	4250	:BD7828654282F89A, 41F	4560	:00AD818C80000018, 29A
3E88	:A47C8C8A18A87D8E, 38F	4258	:F046F7F40421E3239, 349	4568	:AD20181800D031AD, 35C
3E90	:2B1880C479A8738E, 367	4260	:D1023250E3C412B, 282	4570	:1A18C0C0D087A13, 381
3E98	:1E1880C1F18A47C8, 2A5	4268	:43718119D0881133, 22E	4578	:18C900D00A040C18, 278
3EAO	:2C18A87D8E2D1880, 28A	4270	:F4D14821B5742B18, 408	4580	:22AAAC1318CA0C8, 35E
3EAB	:A479A8738E181881E, 35E	4278	:00C4F7C0B4A0D78, 32D	4588	:F0B8C8C3118D013, 38E
3EBC	:211880CA479A8738E, 35E	4280	:F65811C3B44D7921, 2FD	4590	:00BDA4A23A90C8D4, 287
3EB8	:211880C31880CA479, 27E	4288	:A003C0856C08F4DE, 48F	4598	:23202B28304CDF2, 13D
3EC0	:A47C8C8A18A87D8E, 38F	4290	:7C8A7F7C0B4A0D78, 32D	4600	:0000000000000000, 000
3EC8	:A47C8C8A18A87D8E, 38F	4298	:003ABE85847FF1A8, 3C2	4608	:00C0F1298186800A8, 2C3
3ED0	:201880C2222222222, 157	4300	:44F4A8D15182BA1A, 40B	4610	:CC3818D017A900B8, 337
3ED8	:201880C2222222222, 157	4308	:44F4A8D15182BA1A, 40B	4618	:8D37188C1B18A0C8, 34E
3EE0	:E522E2E2E2E2E2E2, 50F	4310	:992222892D1D429E, 27C	4620	:01A8CC3518D00A8, 340
3EE8	:2222E2E2E2E2E2E2, 50F	4318	:FF6DB1A5A13632A0, 48E	4628	:FF8D39188C2118A9, 34B
3EF0	:A003C0856C08F4DE, 48F	4320	:992222892D1D429E, 27C	4630	:23202B2324C6F21A, 217
3EF8	:EEEEEEEEEEEEEEEE758, 458	4328	:36D43AD491A8E61E, 464	4638	:AC1B18AD3718C800, 244
3F00	:E222222222222222, 1C0	4330	:3DA803AD113E5248, 289	4640	:F0C8C8C3118D013, 38E
3F08	:E222222222222222, 1C0	4338	:E0822A080924E0F8, 38F	4648	:A9008D37184C0322, 1F8
3F10	:E222222222222222, 1C0	4340	:10D0F4583A89818F, 45F	4650	:88C3C218D0C0A8FF, 41B
3F18	:E222222222222222, 1C0	4348	:E0822A080924E0F8, 38F	4658	:88C3C218D0C0A8FF, 41B
3F20	:E222222222222222, 1C0	4350	:10D0F4583A89818F, 45F	4660	:88C3C218D0C0A8FF, 41B
3F28	:E222222222222222, 1C0	4358	:E0822A080924E0F8, 38F	4668	:88C3C218D0C0A8FF, 41B
3F30	:E222222222222222, 1C0	4360	:10D0F4583A89818F, 45F	4670	:88C3C218D0C0A8FF, 41B
3F38	:E222222222222222, 1C0	4368	:E0822A080924E0F8, 38F	4678	:88C3C218D0C0A8FF, 41B
3F40	:E222222222222222, 1C0	4370	:10D0F4583A89818F, 45F	4680	:88C3C218D0C0A8FF, 41B
3F48	:E222222222222222, 1C0	4378	:E0822A080924E0F8, 38F	4688	:88C3C218D0C0A8FF, 41B
3F50	:E222222222222222, 1C0	4380	:10D0F4583A89818F, 45F	4690	:88C3C218D0C0A8FF, 41B
3F58	:E222222222222222, 1C0	4388	:E0822A080924E0F8, 38F	4698	:88C3C218D0C0A8FF, 41B
3F60	:E222222222222222, 1C0	4390	:10D0F4583A89818F, 45F	4700	:88C3C218D0C0A8FF, 41B
3F68	:E222222222222222, 1C0	4398	:E0822A080924E0F8, 38F	4708	:88C3C218D0C0A8FF, 41B
3F70	:E222222222222222, 1C0	4400	:10D0F4583A89818F, 45F	4710	:88C3C218D0C0A8FF, 41B
3F78	:E222222222222222, 1C0	4408	:E0822A080924E0F8, 38F	4718	:88C3C218D0C0A8FF, 41B
3F80	:E222222222222222, 1C0	4410	:10D0F4583A89818F, 45F	4720	:88C3C218D0C0A8FF, 41B
3F88	:E222222222222222, 1C0	4418	:E0822A080924E0F8, 38F	4728	:88C3C218D0C0A8FF, 41B
3F90	:E222222222222222, 1C0	4420	:10D0F4583A89818F, 45F	4730	:88C3C218D0C0A8FF, 41B
3F98	:E222222222222222, 1C0	4428	:E0822A080924E0F8, 38F	4738	:88C3C218D0C0A8FF, 41B
3FA0	:E222222222222222, 1C0	4430	:10D0F4583A89818F, 45F	4740	:88C3C218D0C0A8FF, 41B
3FA8	:E222222222222222, 1C0	4438	:E0822A080924E0F8, 38F	4748	:88C3C218D0C0A8FF, 41B
3FB0	:E222222222222222, 1C0	4440	:10D0F4583A89818F, 45F	4750	:88C3C218D0C0A8FF, 41B
3FB8	:E222222222222222, 1C0	4448	:E0822A080924E0F8, 38F	4758	:88C3C218D0C0A8FF, 41B
3FC0	:E222222222222222, 1C0	4450	:10D0F4583A89818F, 45F	4760	:88C3C218D0C0A8FF, 41B
3FC8	:E222222222222222, 1C0	4458	:E0822A080924E0F8, 38F	4768	:88C3C218D0C0A8FF, 41B
3FD0	:E222222222222222, 1C0	4460	:10D0F4583A89818F, 45F	4770	:88C3C218D0C0A8FF, 41B
3FD8	:E222222222222222, 1C0	4468	:E0822A080924E0F8, 38F	4778	:88C3C218D0C0A8FF, 41B
3FE0	:E222222222222222, 1C0	4470	:10D0F4583A89818F, 45F	4780	:88C3C218D0C0A8FF, 41B
3FE8	:E222222222222222, 1C0	4478	:E0822A080924E0F8, 38F	4788	:88C3C218D0C0A8FF, 41B
3FF0	:E222222222222222, 1C0	4480	:10D0F4583A89818F, 45F	4790	:88C3C218D0C0A8FF, 41B
3FF8	:E222222222222222, 1C0	4488	:E0822A080924E0F8, 38F	4798	:88C3C218D0C0A8FF, 41B
4000	:E222222222222222, 1C0	4490	:10D0F4583A89818F, 45F	4800	:88C3C218D0C0A8FF, 41B
4008	:E222222222222222, 1C0	4498	:E0822A080924E0F8, 38F	4808	:88C3C218D0C0A8FF, 41B
4010	:E222222222222222, 1C0	4500	:10D0F4583A89818F, 45F	4810	:88C3C218D0C0A8FF, 41B
4018	:E222222222222222, 1C0	4508	:E0822A080924E0F8, 38F	4818	:88C3C218D0C0A8FF, 41B
4020	:E222222222222222, 1C0	4510	:10D0F4583A89818F, 45F	4820	:88C3C218D0C0A8FF, 41B
4028	:E222222222222222, 1C0	4518	:E0822A080924E0F8, 38F	4828	:88C3C218D0C0A8FF, 41B
4030	:E222222222222222, 1C0	4520	:10D0F4583A89818F, 45F	4830	:88C3C218D0C0A8FF, 41B
4038	:E222222222222222, 1C0	4528	:E0822A080924E0F8, 38F	4838	:88C3C218D0C0A8FF, 41B
4040	:E222222222222222, 1C0	4530	:10D0F4583A89818F, 45F	4840	:88C3C218D0C0A8FF, 41B
4048	:E222222222222222, 1C0	4538	:E0822A080924E0F8, 38F	4848	:88C3C218D0C0A8FF, 41B
4050	:E222222222222222, 1C0	4540	:10D0F4583A89818F, 45F	4850	:88C3C218D0C0A8FF, 41B
4058	:E222222222222222, 1C0	4548	:E0822A080924E0F8, 38F	4858	:88C3C218D0C0A8FF, 41B
4060	:E222222222222222, 1C0	4550	:10D0F4583A89818F, 45F	4860	:88C3C218D0C0A8FF, 41B
4068	:E222222222222222, 1C0	4558	:E0822A080924E0F8, 38F	4868	:88C3C218D0C0A8FF, 41B
4070	:E222222222222222, 1C0	4560	:10D0F4583A89818F, 45F	4870	:88C3C218D0C0A8FF, 41B
4078	:E222222222222222, 1C0	4568	:E0822A080924E0F8, 38F	4878	:88C3C218D0C0A8FF, 41B
4080	:E222222222222222, 1C0	4570	:10D0F4583A89818F, 45F	4880	:88C3C218D0C0A8FF, 41B
4088	:E222222222222222, 1C0	4578	:E0822A080924E0F8, 38F	4888	:88C3C218D0C0A8FF, 41B
4090	:E222222222222222, 1C0	4580	:10D0F4583A89818F, 45F	4890	:88C3C218D0C0A8FF, 41B
4098	:E222222222222222, 1C0	4588	:E0822A080924E0F8, 38F	4898	:88C3C218D0C0A8FF, 41B
4100	:E222222222222222, 1C0	4590	:10D0F4583A89818F, 45F	4900	:88C3C218D0C0A8FF, 41B
4108	:E222222222222222, 1C0	4598	:E0822A080924E0F8, 38F	4908	:88C3C218D0C0A8FF, 41B
4110	:E222222222222222, 1C0	4600	:10D0F4583A89818F, 45F	4910	:88C3C218D0C0A8FF, 41B
4118	:E222222222222222, 1C0	4608	:E0822A080924E0F8, 38F	4918	:88C3C218D0C0A8FF, 41B
4120	:E222222222222222, 1C0	4610	:10D0F4583A89818F, 45F	4920	:88C3C218D0C0A8FF, 41B
4128	:E222222222222222, 1C0	4618	:E0822A080924E0F8, 38F	4928	:88C3C218D0C0A8FF, 41B



WORD PROCESSOR

by Glenn Counsell

There must be many computer owners like myself who, whilst very interested in the idea of a wordprocessor, have never felt like forking out the £20+ needed to buy a decent one.

This program for the Amstrad 464 with/without DD1, Amstrad 664 and Amstrad 6128 to be published over the next few weeks, is a fully fledged 'what

you see is what you get' wordprocessor that compares favourably with many on the market.

Despite being written in Basic, it has many of the complicated features (search-and-replace, block transfer...) found only in the best commercially available ones and should give the user a valid first entry into the field.

More listing and the beginning of

but the functions description next week, but if your fingers can't stand so much button pushing so early in the year then copies of the program can be obtained from G. Counsell, 216a Banbury Rd, Oxford for £7.00 (disc) or £3.00 (tape).

Please state also whether you require the version of the program to work on disc or tape.

```

10 ON BREAK GOSUB 5600
20 MODE 2
30 BORDER 0:INK 1,26:INK 0,0:PEN 1:PAPER 0:PEN #3,
0:PAPER #3,1
40 cpr=1:tl=1:prfg=0:pfpg=0:dlfg=0:btfg=0:infq=0
50 DIM key$(255,2)
60 WINDOW #4,0,13,1,1:WINDOW #5,27,32,1,1
70 WINDOW #6,40,80,1,1:WINDOW #7,1,30,2,2
80 DATA 0,0,1,1,70,86,21,60,86,cd,77,8c,32,60,86,
c9
90 MEMORY #6640
100 FOR i=66651 TO 6665F:READ a$:POKE i,VAL("6")+a$
:NEXT i
110 PRINT "text width or file name ? "
120 a$=0:GOSUB 5460:a$=a$+1
130 a$=VAL(a$)
140 IF STR$(a$)="" *a$ THEN 190
150 LOCATE 1,1:GOSUB 5430
160 IF PEEK(66660)=22 THEN 180
170 LOCATE 27,1:PRINT CHR$(62):GOTO 120
180 GOSUB 2590:GOTO 230
190 IF q3 AND q<79 THEN 210
200 CLS:GOTO 110
210 z$=INT(24000/q)
220 DIM z$(z$)
230 i=INT((80-q)/2):r=60:1:WINDOW #2,1,r,3,25
240 FOR i=1 TO 31:key$(i,0)=i:NEXT i
250 FOR i=32 TO 255:key$(i,0)=3:NEXT i
260 CLS:PEN #2,0:PAPER #2,1:CLS #2
270 IF STR$(a$)="" *a$ THEN 310
280 p1=1
290 IF tl=1:23 THEN p1=23
300 FOR i=1 TO p1:PRINT#2,z$(i):NEXT i
310 DATA 240,241,242,243,13,127,19,16,12,6,10,4,20
,3,5,9,16,246,247,244,245,248,249,14
320 FOR i=1 TO 24:READ a$:key$(a,0)=2:key$(a,1)=1
:NEXT i
330 cpr=1:tl=1
340 PRINT "line # text length"
350 CLS #4:PEN #4,tl:CLS #5:PRINT #5,tl
360 LOCATE #2,cpr,cpr:PRINT#2,CHR$(95);
370 a$=INKEY$
380 IF a$="" THEN 370
390 ON key$(ASC(a$),0) GOTO 370,400,430
400 tl=infq+(a$tl-atlb)
410 ON key$(ASC(a$),1) GOSUB 850,1150,1470,1630,1
760,1910,2080,2210,2340,2700,3150,3660,3960,4
460,4500,2700,1470,1630,850,1150,4680,5110,5350
420 GOTO 370
430 tl=infq+(a$tl-atlb)
440 GOSUB 660
450 GOTO 370
460 IF LEN(z$(tl))=1: THEN 530
470 IF cpr<LEN(z$(tl))+1 THEN 770
480 LOCATE #2,cpr,cpr:PRINT#2,a$
490 z$(tl)=z$(tl)+a$
500 cpr=cpr+1
510 LOCATE #2,cpr,cpr:PRINT#2,CHR$(95);
520 RETURN
530 IF tl=tlb AND cpr=LEN(z$(tl))+1 THEN 550
540 SOUND 1,60,3,12: SOUND 1,60,1,0:RETURN
550 IF tl=tlb THEN 540
560 z$(tl)=z$(tl)+a$
570 FOR i=LEN(z$(tl)) TO 2 STEP -1:IF MID$(z$(tl),
i,1)="" THEN a10
580 NEXT i
590 z$(tl)=LEFT$(z$(tl),LEN(z$(tl))-1)
600 RETURN
610 cpr=1:tl=1
620 LOCATE #2,cpr,cpr
630 WINDOW #3,cpr,r,cpr+2:cpr+2:CLS #3
640 IF cpr>23 THEN 670
650 LOCATE #2,r,25:PRINT#2
660 GOTO 680
670 cpr=cpr+1
680 cpr=1:tl=1:tlb=tlb+1
690 LOCATE #2,cpr,cpr:PRINT#2,CHR$(95);
700 CLS #4:PRINT#4,tl+tlb:CLS #5:PRINT#5,tlb
710 PRINT#2,p1
720 cpr=LEN(z$(tl))+1
730 z$(tl)=LEFT$(z$(tl)-1)+LEFT$(z$(tl-1),1)
740 LOCATE #2,cpr,cpr:PRINT#2,CHR$(95);
750 CLS #4:PRINT#4,tl+tlb:CLS #5:PRINT#5,tlb
760 RETURN
770 LOCATE #2,cpr,cpr
780 p$=RIGHT$(z$(tl),LEN(z$(tl))-cpr+1)
790 PRINT#2,p$
800 z$(tl)=LEFT$(z$(tl),cpr-1)+a$+p$
810 cpr=cpr+1
820 LOCATE #2,cpr,cpr:PEN #2,1:PAPER #2,0
830 PRINT#2,LEFT$(p$,1):PEN #2,0:PAPER #2,1
840 RETURN
850 ufg=0
860 IF ASC(a$)=244 THEN ufg=40
870 IF cpr=1 AND CLS#4:infq=(a$-n-2) THEN 1030
880 IF tl=infq-(n-2) THEN 1040
890 IF cpr=1 THEN 1070
900 IF cpr=LEN(z$(tl))+1 THEN 930
910 LOCATE #2,cpr,cpr:PRINT#2,MID$(z$(tl),cpr,1)
:
920 GOTO 940
930 LOCATE #2,cpr,cpr:PRINT#2," "
940 IF ASC(a$)<244 THEN 980
950 tl=tl+1:tl=1:cpr=1
960 IF tl=infq-(n-2) THEN tl=infq-(n-2)
970 cpr=cpr-tl+1:GOTO 990
980 cpr=cpr-tl+1:tl=1
990 cpr=LEN(z$(tl))+1
1000 LOCATE #2,cpr,cpr:PRINT#2,CHR$(95);
1010 CLS #4:PRINT#4,tl+tlb
1020 RETURN
1030 IF tl=infq-(n-2) THEN 1050
1040 SOUND 1,60,3,12: SOUND 1,60,1,0:RETURN
1050 tl=infq-(n-2)
1060 GOTO 1080
1070 tl=tl-10:ufg
1080 LOCATE #2,1,1
1090 FOR i=tl TO 1:21:PRINT#2,z$(i):CHR$(18):NEXT
i
1100 PRINT#2,z$(tl+22):CHR$(18);
1110 cpr=LEN(z$(tl))+1
1120 LOCATE #2,cpr,cpr:PRINT#2,CHR$(95);
1130 CLS #4:PRINT#4,tl+tlb
1140 RETURN
1150 lfg=0
1160 IF ASC(a$)=245 THEN lfg=40
1170 IF cpr=23 AND tl+tlb-1-lfg THEN 1340
1180 IF cpr=23 THEN 1380
1190 IF tl<tlb THEN 1210
1200 SOUND 1,60,3,12: SOUND 1,60,1,0:RETURN
1210 IF cpr=LEN(z$(tl))+1 THEN 1240
1220 LOCATE #2,cpr,cpr:PRINT#2,MID$(z$(tl),cpr,
1)
1230 GOTO 1290
1240 LOCATE #2,cpr,cpr:PRINT#2," "
1250 IF ASC(a$)<245 THEN 1270
1260 tl=tl+1:tl=1:cpr=23
1270 IF tl=tlb THEN tl=tlb
1280 cpr=cpr-tl+1:tl=1:GOTO 1300
1290 cpr=cpr-tl+1:tl=1
1300 cpr=LEN(z$(tl))+1
1310 LOCATE #2,cpr,cpr:PRINT#2,CHR$(95);
1320 CLS #4:PRINT#4,tl+tlb
1330 RETURN
1340 IF tl=tlb THEN 1360
1350 SOUND 1,60,3,12: SOUND 1,60,1,0:RETURN
1360 tl=tlb-22
1370 GOTO 1390
1380 tl=tl-12+lfg
1390 LOCATE #2,1,1
1400 FOR i=tl TO tl+21:PRINT#2,z$(i):CHR$(18):NEXT
i
1410 PRINT#2,z$(tl+22):CHR$(18);
1420 tl=tl+22:cpr=23
1430 cpr=LEN(z$(tl))+1
1440 LOCATE #2,cpr,cpr:PRINT#2,CHR$(95);
1450 CLS #4:PRINT#4,tl+tlb
1460 RETURN
1470 IF cpr<1 THEN 1490
1480 SOUND 1,60,3,12: SOUND 1,60,1,0:RETURN
1490 IF cpr<LEN(z$(tl))+1 THEN 1570
1500 LOCATE #2,cpr,cpr:PRINT#2," "
1510 IF ASC(a$)<244 THEN 1530
1520 cpr=1:GOTO 1540
1530 cpr=cpr-1
1540 PEN #2,1:PAPER #2,0:LOCATE #2,cpr,cpr
1550 PRINT#2,MID$(z$(tl),cpr,1):PEN #2,0:PAPER #
2,1
1560 RETURN
1570 LOCATE #2,cpr,cpr:PRINT#2,MID$(z$(tl),cpr,1)
:
1580 IF ASC(a$)<244 THEN 1600
1590 cpr=1:GOTO 1610
1600 cpr=cpr-1
1610 LOCATE #2,cpr,cpr:PRINT#2,MID$(z$(tl),cpr,1)
:
1620 RETURN
1630 IF cpr<LEN(z$(tl))+1 THEN 1650
1640 SOUND 1,60,3,12: SOUND 1,60,1,0:RETURN
1650 IF cpr<LEN(z$(tl))+1 THEN 1700
1660 LOCATE #2,cpr,cpr:PRINT#2,MID$(z$(tl),cpr,1)
:
1670 cpr=cpr+1
1680 LOCATE #2,cpr,cpr:PRINT#2,CHR$(95);
1690 RETURN
1700 LOCATE #2,cpr,cpr:PRINT#2,MID$(z$(tl),cpr,1)
:
1710 PEN #2,1:PAPER #2,0
1720 IF ASC(a$)<247 THEN 1750
1730 cpr=LEN(z$(tl))+1:PEN #2,0:PAPER #2,1:GOTO 1
600
1740 cpr=cpr+1
1750 LOCATE #2,cpr,cpr:PRINT#2,MID$(z$(tl),cpr,1)
:
1760 PEN #2,0:PAPER #2,1
1770 IF ASC(a$)<247 THEN 1790
1780 IF tl=mdm THEN 1770
1790 IF cpr=LEN(z$(tl))+1 THEN 1820
1800 LOCATE #2,cpr,cpr:PRINT#2,MID$(z$(tl),cpr,1)
:
1810 GOTO 1830
1820 LOCATE #2,cpr,cpr:PRINT#2," "
1830 IF cpr>23 THEN 1860
1840 LOCATE #2,r,25:PRINT#2
1850 GOTO 1870
1860 cpr=cpr+1
1870 cpr=1:tl=1:tlb=tlb+1
1880 LOCATE #2,cpr,cpr:PRINT#2,CHR$(95);
1890 CLS #4:PRINT#4,tl+tlb:CLS #5:PRINT#5,tlb
1900 RETURN
1910 IF cpr<1 THEN 1930
1920 SOUND 1,60,3,12: SOUND 1,60,1,0:RETURN
1930 IF cpr<LEN(z$(tl))+1 THEN 1990
1940 z$(tl)=LEFT$(z$(tl),LEN(z$(tl))-1)
1950 LOCATE #2,cpr,cpr:PRINT#2," "
1960 cpr=cpr-1
1970 LOCATE #2,cpr,cpr:PRINT#2,CHR$(95);
1980 RETURN

```


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Demon spell

Some people have written about the *Fairlight* hacking routine that we printed a few weeks ago. This listing was produced from a working copy tape and there is nothing wrong with it; the problem is that there are two different copies of *Fairlight* doing the rounds so you may have the wrong sort.

Chris Allen, who prepared the routine for us, has kindly offered that if anyone who still has problems will write to him with a SAE and a tape, he will try to sort it out. Chris's address has appeared more than once in the column, but anyone who hasn't got it can write care of me.

Now then Melbourne House's queer, but enjoyable *Rock 'N' Wrestle* is deservedly riding high in the charts. Here is a small tip for the game from Chris Eastwood of Witney. All you need to do is kick the other wrestler and, on the early stages at least, he won't move or do anything. Keep doing this until he runs out of energy and then just throw him.

Chris has also found some useful bugs in some other popular Commodore games. On the CBM version of *Ultimate's Underworld*, start the game and go left into the dead end. Stand under the clock's left pendulum and jump upward. You will bounce sideways up past the clock and through the roof to level 14. If it doesn't work the first time, try it again as it is very useful for skipping about 25 screens.

On *Ultimate's Outlaws* after you have shot one of the outlaws in the street, continue to shoot the flashing '200' and you will find that the amount of outlaws you need to kill is decreased every time you hit it.

Paul Miller has provided us with another excellent routine (above) for the Spectrum version of *Raid Over Moscow*.

Now we can return to the complete *Dragonarc* solution - with thanks to Hewson for supplying not only the tips, but also one of the most complex and enjoyable games available.

Ruins of Cantii

We left you in the ruins of Cantii just after you have found the crown symbol in the chest. You must now try and get out with this. Beware of the axe and fireball room

```
5 REM Raid Over Moscow Pokes
10 CLEAR 65535:POKE 65535,195
20 FOR A=45043 TO 45081:READ B:POKE A,B:
NEXT A
30 PRINT AT 9,B;"Play tape from start"
40 RANDOMIZE USR 45075
50 MERGE **:LOAD **
99 REM
```

MACHINE CODE DATA

```
100 DATA 245,229,58,239,95,254
110 DATA 63,32,15,237,86,237,71
120 DATA 33,107,107,34,230,96
130 DATA 62,62,50,217,96,62,147
140 DATA 50,212,96,195,58,0,62
150 DATA 59,237,71,237,94,201
```

When the game has loaded, it will return to Basic you then enter your poke (See Below), and then to run the game enter,

RANDOMIZE USR 32768

POKE 44512,182

POKE 30414,182

POKE 37473,174

POKE 37474,157

POKE 40299,182

POKE 43364,182

POKE 46507,182

POKE 49130,182

POKE 43369,182

Infinite Lives

Bypass Hanger Screen

Infinite planes during attack run

and use *Slow* and *Unseen* if necessary.

Search the tomb with the crown symbol and you should find another stone and the message 'When four are gone

in to go to Hellsmouth. Bring the torch here.

This is inhabited by 'nervous but deadly' yellow imps that have the habit of firing at you and running off. Use *Warrior* to get them and use *Wall* to protect against their missiles. This place is also inhabited by bats, killed by missiles, and snakes, killed with a torch.

Find the axe to smash the eggs, avoid or kill the snakes and take the chest key. Find the chest and open it to get the crown symbol.

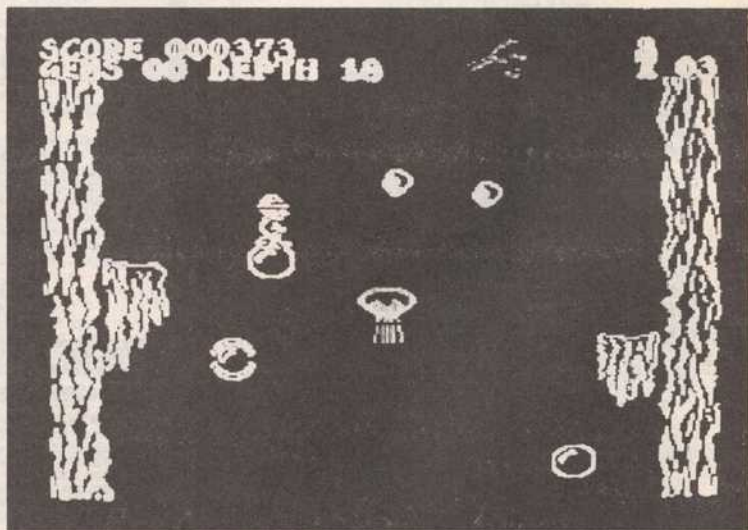
Place the symbol on the cursed key, avoiding the balls of red fire. *Unseen* or *Slow* will help here.

Use the key to unlock the door. Fire the *Demon* spell when you see the demon (this is what the message 'Set a thief . . . ' means, ie, use like to deal with like). Take the crown. Kill the eyes with *Bane*. Put crown symbol on stone to leave or use *Return*. Put the third crown on the anvil to destroy it.

The Cursed Crypt

The next area to explore is largely uninhabited woods but there is a goblin patrol that has found a chest. Use *Mantle* to protect yourself from demon missiles. Kill the demon with *Missile*.

First find the rabbit. Place it down the hole to get the key. Go back to the circle. Take the other path. Find the chest and open it with the key. Take the *Ankh* symbol. Go back and get the rabbit



Underworld from *Ultimate*

smite anvil with stone' ie, use the crystal of antithought when the four crowns are destroyed. Use the two S symbols to reveal the exit or use the *Return* spell. Go to Halgar's anvil and place the crown on it.

Search the leaves for the *Bane* gem. Take the bird and you get the message 'Set a thief . . . '. Search the stump for a coin. Put the coin in the water and jump

again. Find the single hole. Put the rabbit down it and avoid the snake. Take the spell from the hole.

Take the rabbit to the carrots to reveal the flagstone. Use the *Ankh* to move the stone and go down, taking the cursed key and the symbol. The torch will again be useful. The underground is inhabited by wraiths, use *Bane* on them. More next week.

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Tony Bridge's Adventure Corner



Beatlemania

One, two, three, four, can I have a little more/Five, six, seven, eight, nine, ten, I love you. And we all love The Beatles, right? Well, you may be a little too young to remember the days when all that mattered was the latest Beatle record, or how Ringo was cutting his hair, or how high Paul's heels were this week. But back in '65 or so, these nuggets of information were essential to anyone who wanted to retain their credibility. What is the relevance of all this, I hear you ask. Well, *Beatle Quest*, from Number 9 Software, available as a text adventure for some months now on the Commodore, has been recently released with added graphics for the Spectrum.

Esoteric

In the '60s, which one or two of you may remember, every single line of a Beatles song and every album cover was pored over by self-respecting fans searching for esoteric clues. There were those who claimed to have discovered that Paul McCartney was dead (the number plate on the Beetle - geddit? - was 28IF, meaning, of course, that Paul would have been 28 that year if he had lived) while others claimed to have heard strange prophecies in the run-off groove of Sergeant Pepper.

Charles Manson took it all one step further when he listened to songs like *Helter-Skelter* ("Look out 'cos here she comes") and *Piggies* ("What they need's a damn good whacking"): he went out and whacked Sharon Tate and several other innocent bystanders.

Oh, that the home computing was big and *The Quill* available, back then! Garry Marsh, the author of *Beatle Quest*, would have surely been right there with the rest of us Beatle fans, bringing our favourite lyrics to life: as it is, *The Quill* has come a few years too late, but there is still of course a vast army of Beatle maniacs (like myself) who are prepared to invest in anything that might recapture for a moment those great days of the late '60s.

Garry is a great student of Beatledom, particularly the lyrics of their songs. *The*

Quest, first of a trilogy, contains many esoteric references to the songs, and much of the scenario of the adventure follows the storyline of the songs mentioned. Obviously then, a dedicated fan will catch many references that others might miss, and so probably gain a better insight into the game than a beginner in Beatle lore. For example, the dreaded 'Quill-kill' comes into play in the first few moves.

Bed-sit

The first location allows plenty of exploration, and there are several useful objects to be found here. But, venture outside the door of the Bed-sit and you have a certain number of moves before Maxwell's Silver Hammer comes down upon your head and you're done for. You just have enough time, though, to get upstairs, go in to the bathroom, and find that the window looks to have been recently opened. Aha! *She Came in Through the Bathroom Window* springs immediately to mind, doesn't it? Well, listen to *Abbey Road* and the second line of the song will give you a pretty strong clue as to how to escape Maxwell's 'orrible' hammer. Never mind if you don't actually know the song, you'll find the solution to this particular problem if you just apply the adventurer's code and search thoroughly.

And so go most of the problems - a Beatle lover's insight will make the whole thing more pleasurable, but the game can certainly be worked through by anyone using just the usual amount of thought (you'll even come across the obligatory herring, though this one is very useful).

In fact, just about every location contains some such memory-stirring device: in the market-place, as you will have guessed, you'll find a barrow, marked 'Desmond and Molly Jones'. That's a more easily recognisable reference to *Ob-la-di, Ob-la-da*, and may thus afford some sort of clue if you remember the lyric to that song.

But to start at the beginning... as keeper of The Archives, a treasure-house of all the remnants of Earth's history, residing for some reason on Space Station 9 in the year 2953. Your needs are catered for by the supreme machine, Sel-Taeb 4. Becoming fascinated by the ancient stories of the 'Four

Kings of Emi' and their battle with 'Their Satanic Majesties', you feed all known data into the memory banks of the pleasure-dome, where dreams become reality - even the dream of time-travel...

So it is that you find yourself transported back to that small bed-sit circa 1969. Across the room is 'a girl, just 17, and the way she looked was just beyond compare'. Or course, I immediately tried dancing with her (after all, how could I dance with another?) - nothing doing. Then I tried holding her hand (aha, I thought, a *double* reference here; 'I held her hand in mine' from the same song, as well, *I Wanna Hold Your Hand*) but still nothing. The only response unfortunately, is elicited by doing something naughty, in which case, you're dead!

Puzzle

One of the songs that will come in particularly handy, bearing in mind the enlightened age of the late '60s is *Lucy in the Sky with Diamonds*.

You'll have a chance to sit in the train with plasticine porters with looking glass ties and be transported via a certain substance (found near the start) to a boat on a river with tangerine trees and marmalade skies. There's also a nice little puzzle involving those 'flowers that grow so incredibly high' in an amusing pastiche of the well-known Level 9 problem.

Beatle Quest is *Quill'd*, *Patch'd*, *Illustrat'd* and very well written for the Spectrum and Commodore on one tape. The character set is attractively legible, and the Ramsave feature is welcome. Not only do the problems and descriptions drip with Beatle references, but so do the responses: 'I don't understand' becomes instead 'Goo goo g'joob' and 'Help' of course gets the reply (obviously) 'You'll get by with a little help from your friends'.

Beatle fans, get this one at all costs - it's the official version, as Garry Marsh has obtained permission from ATV Music to use the lyrics.

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Top Twenty

1	(1) Kung Fu Master (C64)	US Gold
2	(16) Elite (Spectrum/C64/BBC/Amstrad)	Acornsoft/Firebird
3	(-) Eidolon (C64/Atari)	Activision
4	(2) Yie Ar Kung Fu (Various)	Imagine
5	(7) Formula One Simulator (Various)	Mastertronic
6	(13) Hypersports (Various)	Imagine
7	(-) Movie (Spectrum)	Imagine
8	(18) Barry McGuigan (Spectrum/C64/Amstrad)	Activision
9	(4) Rock 'n' Wrestle (C64)	Melbourne House
10	(3) Winter Games (Spectrum/C64/Amstrad)	Epyx/US Gold
11	(9) Action Biker (Spectrum/C64/C16/Amstrad)	Mastertronic
12	(12) Finders Keepers (Spectrum/C64/Amstrad/MSX)	Mastertronic
13	(-) Big Mac (C64/C16)	Mastertronic
14	(5) Commando (Spectrum/C64)	Elite
15	(6) BMX Racers (Spectrum/C64/C16)	Mastertronic
16	(14) Spellbound (Spectrum/Amstrad)	Mastertronic
17	(10) They Sold A Million (Spectrum/C64/Amstrad)	Hit Squad
18	(8) Rambo (Spectrum/C64)	Ocean
19	(17) Rockman (Spectrum/C64/C16/Vic 20)	Mastertronic
20	(-) Vegas Jackpot (Spectrum/C64/C16/Vic 20/Dragon)	Mastertronic

Figures compiled by Gallup/Microscope

Readers' Chart No 62

1	(1) Commando (Spectrum/C64)	Elite
2	(2) Elite (Spectrum/C64/BBC)	Firebird/Acornsoft
3	(3) Winter Games (Spectrum/C64)	Epyx/US Gold
4	(5) Lord of the Rings (Spectrum/Amstrad)	Melbourne House
5	(6) Rambo (Spectrum/C64)	Ocean
6	(7) They Sold A Million (Spectrum/C64)	Hit Squad
7	(-) Way of the Exploding Fist (various)	Melbourne House
8	(-) Tomahawk (Spectrum)	Digital Integration
9	(8) Saboteur (Spectrum)	Mastertronic
10	(10) Swords and Sorcery (Spectrum)	PSS

Winning Phrase No 62: "CES! - get down to LA, man", from Laurence Scottford of Eastbourne in Sussex, who wins £25. An honourable mention to Mark Lumley of Morden, Surrey, for "Let me win one Amiga".

Now voting on week 64 - £25 to win

Each week *Popular* is compiling its own special software top ten chart - compiled by YOU.

And each week we will send £25 to the person who sends in, with their chart votes, the most original (witty, neat or clever - but never rude) phrase or sentence made up from the letters (you don't have to use them all) in the titles of the top three programs in this week's Readers' Chart, published above.

You can still vote in the chart without making up a slogan - but you won't be in with a chance of winning the prize.

All you have to do is fill in the form below (or copy it out if you don't want to damage your magazine) and send it off to: Top 10, *Popular Computing Weekly*, 12-13 Little Newport Street, London WC2H 7PP.

Voting for Week 64 closes at 2pm on Wednesday February 26, 1986. Entries received after that time will not be eligible for inclusion in that week's voting. The judges decision is final. Only one entry per individual per week will be allowed.

Name	My top 3: Voting Week 64
Address	1
.....	2
.....	3
My phrase is:	

New Releases

QUIZZED

Play your Cards Right is a fairly naff TV quiz game in which a medium sized audience repeats certain phrases of Bruce Forsyth's. It has now been converted into a computer game and now you can presumably shout at your computer instead of Bruce - I know I did.

The game involves answering questions all based on guessing what percentage of the country said they would do want, eg, 'We asked ten thousand air hostesses whether they had ever eaten chocolate biscuits on duty.' You have to guess the actual number that said 'Yes' more exactly than the computer (though quite how this section is supposed to work I know not, since the computer must have all the right answers).

Based on right answers, you then get to guess whether the next card in a sequence is

higher or lower than the previous one. This then leads on to the 'Super Game' in which you answer more questions on screen and in the time I spent with it no questions were repeated, so I guess there must be quite a few stored in memory.

This would be a perfect budget game - there isn't anything clever about the programming, but it works quite well and however sneeringly, most of the office was playing it. The reason for the price tag is, I suppose, the big name tie-in, but I'm afraid that doesn't really justify it.

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WHAT MORE?

CRL is justifiably proud of *Tau Ceti* - its 3D line graphics were mixed with excellent gameplay to produce a near classic game. *Tau Ceti* is now available on the Amstrad and is as good as ever - maybe better.

The idea of the game is to battle your way across a planet's surface searching for pieces of cooling rod which must be assembled and then used to destroy a reactor gone AWOL. Sundry considerations include finding fuel, repairing damages and collecting missiles.

The screen is divided into



Pick of the week

BRAIN DAMAGE

Sweevo's Whirled is not spelt incorrectly, for this is the high powered 128 version of *Sweevo's World*, it's the Marx brothers version of *Alien 8*.

Sweevo's Whirled takes the original *Sweevo* game and brings the number of rooms up to 250 which is enough to ensure continuous brain damage for months on end. The rest of the game is unchanged, as *Sweevo* armed only with a parachute, explores one of the strangest planets in the universe and is troubled by, among other things, a very nasty little girl.

On the 128 the game retains, obviously, its excellent, edge-on 3D graphics, but adds to this a fairly decent soundtrack using the brand new (well several years old actually) AY sound chip at the heart of the new machine.

If and when you buy your 128, then this ought to be one of your first purchases.



And what's even better, it doesn't cost any more than the original.

Program *Sweevo's Whirled*
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several sections - the cockpit view has the clever graphics, other sections provide damage reports etc. The 3D scrolling is very neat indeed, nice and smooth, and there is much imagination in the graphic design of the planet. I particularly liked the flashing obelisks (a well known 60's band) and the pyramids.

You get a plot that sustains

This Week

Program	Type	Micro	Price	Supplier	Program	Type	Micro	Price	Supplier
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Mini Office II	Ut	Amstrad	£19.95(D)	Database Software	Kung-Fu Master	Arc	Commodore 64	£14.95(D)	US Gold
CBasic Compiler	Ut	Amstrad (CP/M)	£49.95	Digital Research	Sizzlers Vol 1	Arc	Commodore 64	£9.95(T)	Gremlin Graphics
Dr Draw	Ut	Amstrad (CP/M)	£49.95	Digital Research	Sizzlers Vol 1	Arc	Commodore 64	£14.95(D)	Gremlin Graphics
Dr Graph	Ut	Amstrad (CP/M)	£49.95	Digital Research	Hotline Quiz	S	Commodore 64	£12.95(D)	Chalksoft
Dr Draw	Ut	Amstrad (CP/M)	£49.95	Digital Research	Cad-64	Ut	Commodore 64	£14.95(T)	Orpheus
Pascal MT	Ut	Amstrad (CP/M)	£49.95	Digital Research	Cad-64	Ut	Commodore 64	£18.95(T)	Orpheus
Mini Office II	Ut	Amstrad/BBC B	£14.95(T)	Database Software	Hotline Quiz	S	Commodore 64	£9.95(T)	Chalksoft
Lattice C Compiler	Ut	Atari 520ST	£99.95	Metacomo	Fourmost Adventures	Adv	Spectrum	£7.95	Global Software
MCC Pascal	Ut	Atari 520ST	£89.95	Metacomo	Attack of Killer Tomatoes	Arc	Spectrum	£7.95	Global Software
Macro Assembler	Ut	Atari 520ST	£49.95	Metacomo	Skyfox	Arc	Spectrum	£8.95	Arillasoft
Hotline Quiz	S	BBC B	£14.25	Chalksoft	Smashes Vol 1	Arc	Spectrum	£9.95	Gremlin Graphics
Mini Office II	Ut	BBC B	£16.95(D)	Database Software	Hotline Quiz	S	Spectrum	£9.95	Chalksoft
Commando	Arc	Commodore 16	£7.95	Elite	3 Weeks in Paradise	Arc	Spectrum 128	£10.95	Milko Gen
					Fairlight I	Arc	Spectrum 128	£9.95	The Edge
					Lode Runner	Arc	Spectrum 128	£9.95	Software Projects

the interest for what may be many hours of play, whizz-bang state of the art graphics, and lots and lots of things to blow to bits. I ask you; what more do you need?

Program *Tau Ceti*
Price £8.95
Micro *Amstrad(CPCs)*
Supplier *CRL*
9 Kings Yard
London E15

GEOMETRICAL

Rasputin is one of Firebird's Hot range of games - programs whose quality justifies a conventional rather than budget price tag. The game is available on Spectrum and Amstrad as well, but only on the Commodore does it have the massed balalaikas of Prague as played by Rob Hubbard. This is an important element.

Rasputin is a strange game, the basic plot is simple enough; jump on some things, stab other things and

collect things. What's odd is the sheer look of the game and its extraordinary difficulty. Whilst the former can be counted as a virtue, the latter nearly did for me the first few times I tried to play it.

Despite the name there is nothing that makes the game look particularly Russian. Its playing world is one of geometrical shapes - blocks and cubes - with medieval flourishes, like castle gates and towers and a wide variety of totally strange creatures most of which are unpleasant. Full marks for imagination. Full marks, too, for programming technique; the game features excellent animation combined with an unusual use of 3D perspective to give the whole thing a faintly Escher-like look.

The problem is the game is so difficult that it is quite possible you will never see its myriad screens, difficult not only in the dodging and timing sense but also in the "what the hell is going on anyway" sense. It's a game

that is crying out for every cheat poke under the sun and will doubtless get them, but I can't help thinking that the game shouldn't require that sort of desperate help two minutes after loading.

If you want a really challenging game this is it, if you get frustrated easily all the wonderful graphics in the world won't help you with *Rasputin*.

Program *Rasputin*
Price £7.95
Micro *Commodore 64*
Supplier *Firebird*
Wellington House
Upper St Martins
Lane

POWERFUL

Amsdoc is a powerful utility program to generate annotated expanded listings for purposes of explanation and clarification. It would be ideal for schools using Amstrads or home users developing complex programs in Basic.

The *Amsdoc* utility takes your Basic program and analyses it in various ways. It then produces a new version of the listing which may be dumped to printer or screen. The program is designed to highlight key elements, such as the logical flow or subroutines and loops and the use of variables.

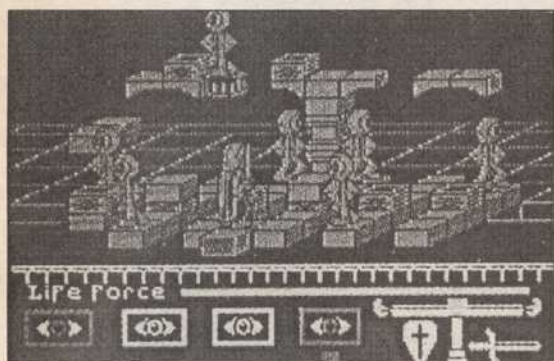
Though there are many formats or annotation available within *Amsdoc*, all are essentially concerned with showing the program logic (or lack of it). For example, the *Flow List* option takes your raw

program and produces a flowchart with each instruction in its logical order, ie, with *Gotos* and *Gosubs* paired with their respective destinations and the level of subroutine clearly marked. Variables are also listed with the lines in which they occur.

There are also options to give you automatic simplification of variable names to save memory as well as dumping the reformatted listings to back up rather than printer, which, amongst other things, lets you print out several copies.

Amsdoc is an incredibly powerful program, I haven't seen anything to compare with it on any other micro, but it is not flawless. The main problem is with the manual which, though detailed, (some of it is in the form of a disc file) offers little compromise to the more casually interested. Very experienced programmers should have little problem with it, but if, as the manufacturer says, the program is to have educational use they should avoid leaping into such phrases as "object program", "absolute break" and even "program output medium" where simpler forms are available. Nevertheless, for serious Basic programmers, highly recommended.

Program *Amsdoc*
Price £12.95
Micro *Amstrad*
Supplier *Session*
Developments
12 Falmouth Road
Congleton
Cheshire



This Week

Artisyl	Ut	Spectrum 128	£12.95	Softechnics
Tasword 128	Ut	Spectrum 128	£19.95	Tasman Software
Writer	Ut	Spectrum 128	£17.95	Softechnics

Key: Ad - adventure S - strategy-simulation
Arc - arcade Ut - Utility Ed - education

Ariolasoft, Asphelte House, Palace St, London W1.
Chalksoft, 37 Willowsea Road, Worcester, WR3 7QP, 0905 55192. **Database Software**, Europa House, 68 Chester Road, Hazel Grove, Stockport, 061-456 8383. **Digital Research**, Unit 1, Station Road, Hungerford, Berks, 0488

84587. **Elite**, 55 Bradford Street, Walsall WS1 3QD 0922 611215. **Global Software**, PO Box 67, London SW11 1BS, 01-228 1380. **Gremlin Graphics**, Alpha House, 10 Carver Street, Sheffield S1 4FS, 0742 753423. **Metacomco**, 26 Portland Square, Bristol BS2 8RZ, 0272 428781. **Mikro Gen**, The Broadway, Bracknell, Berks, 0344 427317. **Orpheus**, The Smithy, Unit 1, Church Farm, Hatley, Beds SG19 3HA. **Softechnics**, 12/13 Henrietta Street, Covent Garden, London WC2E 8HL, 01-240 1422. **Software Projects**, Bearbrand Complex, Allerton Road, Woolton, Liverpool. **Tasman Software**, Springfield House, Hyde Terrace, Leeds LS2 9LN. **The Edge**, 31 Maiden Lane, Covent Garden, London WC2E 8HL, 01-240 1422. **US Gold**, Unit 10, The Parkway Ind Centre, Heneage Street, Birmingham B7 4LY, 021 359 3020.



Aroma of bias

Was I the only person to feel slightly glummer after reading that recent news article in *Popular Computing Weekly*, January 23?

It celebrated a breezy entrepreneur called Gary Kildall, whose latest achievement is to have put *Grolier's American Encyclopaedia* onto a 12-inch video disc. Each video frame holds a page of text, and the whole ingenious thing allows owners of interactive video disc players to flick to any page, subject or cross-reference at will.

It sounds a large and serious operation – the disc apparently offers 160M of encyclopaedic information. So why do I feel vaguely but decidedly hostile to the enterprise?

Well, I've never much liked encyclopaedias. It's something to do with the way those large glum volumes have pretensions to know everything. The bigger the encyclopaedia, the more smugly it seems to declare, "All human knowledge is within. Look no further. These are the facts."

Whereas the truth is, that if there is any subject that you genuinely know a good deal about, and you look it up in even the grandest and most prestigious encyclopaedia, the odds are massively in favour of your finding the relevant article either biased, incomplete, outdated, or subtly misleading.

Look up a high-technology subject like computing in an encyclopaedia, and you'll find a pleasant little nostalgia item,

probably full of interesting facts about punched cards. Fair enough? Can any book be more up-to-date than its day of publication? But when you consider the time that it takes for an encyclopaedia to be put together, you'll realise that this section was probably out of date even before the book was published.

Look up any political or literary subject, and you'll probably find some useful hard facts. But don't be surprised if there's also a just-perceptible aroma of bias – probably towards whatever ideas were fashionable orthodoxy a few years ago. I'm not complaining about bias. I enjoy bias, especially when it's flamboyantly declared. Every interesting piece of writing gets its piquancy from the author's point of view. Encyclopaedias, though, pretend that this isn't so. They make claims to objectivity, and disguise their bias as the voice of authority.

And now Mr Kildall has put his encyclopaedia on video disc. A gleaming 12-inch disc, laser-readable, and covered with hard transparent laminate.

If you find something you disagree with in a Ram database, you can find a way to alter it. If you dislike the tone or judgments of a book, you can at least scribble a rude comment in the margin.

But each tiny flaw lurking in *Grolier's* encyclopaedia (and I'm sure the flaws aren't too many, and that it's a good product – by encyclopaedia standards) is going to be given new permanency on disc. Because it's a Rom disc, it can't be changed.

If we don't look out, this type of knowledge-dispenser could become a standard fixture of our lives – it sounds so efficient, so easy to use, and so reassuring for those who like their information pre-processed and unchallenged.

Now is the time to insist, not exactly on a government health warning, but at least a flashing message at the top of every page: "NB: This information was collected and presented by human beings. They are reasonably expert in their subjects, but do not know everything. There could well be an error or mis-statement somewhere on this page."

George Simmers

Puzzle No 196

If I were to take a single penny and place it on the table, I could place a further six pennies in a ring around it each touching the first. With a further 12 pennies I could arrange a second ring around the first, and by continuing in this manner, adding in turn 24, 36, coins and so on, I can construct a regular compact hexagonal figure.

For example, if I had £1.69 (in pennies), I would have my centre penny surrounded by seven outer rings. Curiously, these same pennies could also be rearranged to form a square of coins with 13 coins along each edge.

If I now had £327.61, I would be able to make a larger hexagonal pattern with 104 rings, or I could rearrange the coins into a square pattern with 181 coins along each edge.

Given unlimited funds, how much would I need before I could next arrange my hexagonal array into a square one?

Solution to Puzzle 191

The pile of pennies contained exactly £901. The problem involves finding a triangular number which is an exact multiple of 100 and is the largest possible without exceeding 100000. Triangular numbers are those in the series 1, 3, 6, 10, 15, etc. That is, those formed from the expression $1+2+3+4+5 \dots$. Only numbers that are triangular will form an exact triangular arrangement as described.

```
10 LET T=0
20 LET L=1
30 LET T=T+L
40 IF T/100=INT(T/100) THEN PRINT T,L
50 IF T>100000 THEN STOP
60 LET L=L+1
70 GOTO 30
```

In the program, variable T is the total triangular number, and variable L is the number of coins in each successive line. Each time that the total (T) is an exact multiple of 100 the value is printed out until the value of (T) exceeds 100000.

Winner of Puzzle No 191

The winner is Alan Hodson of Brook Drive, Astley, Manchester, who will be receiving £10.

Rules

The closing date for puzzle 196 is March 19.

The Hackers

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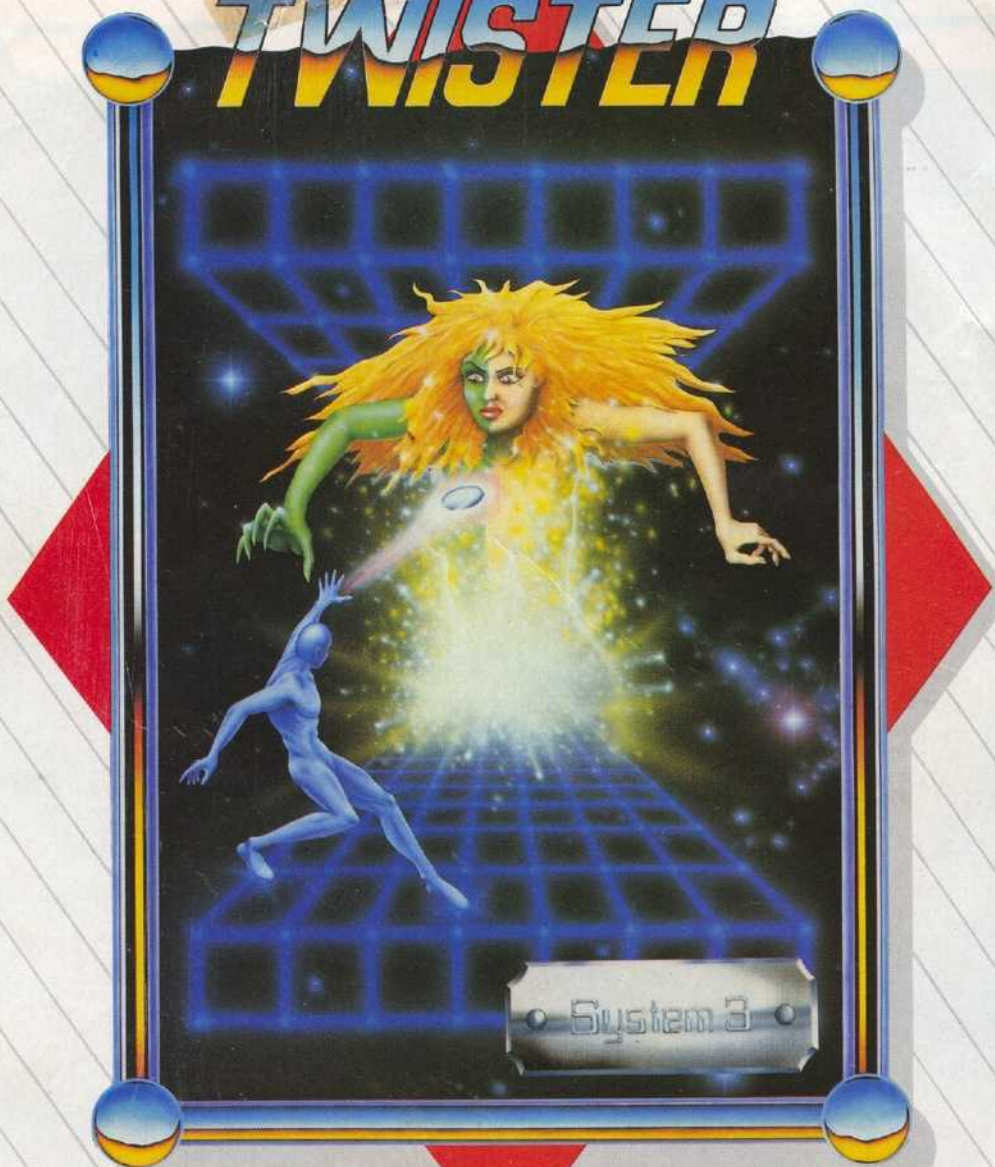
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